

**COMBAT SURGERY:**  
**MEDICAL DECISION TREES**  
**FOR TREATMENT OF**  
**NAVAL COMBAT CASUALTIES**

1 February 1991

Naval Health Research Center  
P.O. Box 85122  
San Diego, CA 92186-5122

**Editors:**

Jerry M. Linenger, M.D., M.S.S.M., M.P.H., Ph.D.  
Commander, Medical Corps, United States Navy  
Department of Epidemiology, Naval Health Research Center, San  
Diego and Clinical Instructor, University of California-  
San Diego School of Medicine, La Jolla, CA.

William B. Long, M.D.  
Thoracic and Trauma Surgeon  
Director of Trauma, Emanuel Hospital, and Assistant Clinical  
Professor, Oregon Health Sciences University, Portland, OR.

William J. Sacco, Ph.D.  
President, Cyometrics, Inc., Bel Air, MD.

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

20000320 080

**COMBAT SURGERY:**  
**MEDICAL DECISION TREES**  
**FOR TREATMENT OF**  
**NAVAL COMBAT CASUALTIES**

1 February 1991

Naval Health Research Center  
P.O. Box 85122  
San Diego, CA 92186-5122

**Editors:**

Jerry M. Linenger, M.D., M.S.S.M., M.P.H., Ph.D.  
Commander, Medical Corps, United States Navy  
Department of Epidemiology, Naval Health Research Center, San  
Diego and Clinical Instructor, University of California-  
San Diego School of Medicine, La Jolla, CA.

William B. Long, M.D.  
Thoracic and Trauma Surgeon  
Director of Trauma, Emanuel Hospital, and Assistant Clinical  
Professor, Oregon Health Sciences University, Portland, OR.

William J. Sacco, Ph.D.  
President, Cyometrics, Inc., Bel Air, MD.

To the "thunder and lightning" Coalition Combat Forces  
participating in Operation Desert Storm 1991, and especially to  
the Medical Support personnel entrusted to their care. Fair  
winds and following seas.

## PREFACE

This book is intended to aid those involved in the treatment of severe trauma suffered during combat. It is especially intended to provide a quick reference to neurosurgeons, thoracic surgeons, and general surgeons with trauma surgery experience involved in treating combat casualties. We believe it would also be useful to the same individuals when working in more mundane settings such as trauma centers and inner city emergency room settings. It can also be used as a teaching guide for residents training in these fields.

Algorithms are one way of assisting and teaching medical thought processes and procedures. They lead from decision to decision in logical patterns and progression. Trauma care lends itself to this analysis, since only through systematic and timely management of the seriously injured patient can the best chance for survival and successful outcome be assured.

We conceive of the decision trees as guidelines, not gospel, for patient management. Although they are dogmatic in presentation, they are intended to be flexible in interpretation, as it is not possible to allow for all contingencies. The surgeon must always be alert to the dynamic physiology and multi-system involvement confounding severe combat injuries and adjust these guidelines to fit the changing clinical picture as it evolves. Retrospective review of particular cases, using these algorithms, might be useful in self-evaluation.

The contained algorithms are not by any means the only approach to managing acute injury. They have, however, served the various originators and reviewers well in resuscitation, diagnosis, and therapy. An iterative process was used throughout the development of these decision nodes in order to arrive at useful guidelines. A large majority of the decision nodes contained in the clinical algorithms represent unanimous acceptance. The remainder represent "consensus" acceptance. Thus, not every surgeon would concur with all decision nodes.

Logisticians, aided by the computer, have checked that the algorithms flow properly. Work is underway in finding ways to improve information transfer time and ease of interpretation. Techniques include the use of computer, sterile keyboards with simplified yes-no keypads to be used in the operating room, and human-factors designed display presentations. All such technology depends on sound underlying algorithms. Since techniques of modern combat surgery are still evolving, the editors welcome all comments, including case reports, with the hope of improving combat care in the future.

Winter, 1991

Jerry Linenger  
Bill Long  
Bill Sacco



The procedures and treatments contained in this book are the views of the writers and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large. While the editors have made every effort to insure the accuracy of the material presented, all readers are advised to check product information sheets where available, to cross-check information whenever possible with other sources, and to always exercise sound clinical judgement.

## CONTRIBUTORS

### NEUROSURGEONS

Arthur L. Amacher, M.D., Department of Neurosurgery, Geisinger Medical Center, Danville, PA.

Michael Carey, M.D., Professor of Neurosurgery, Louisiana State University Medical Center

Berkley L. Rish, M.D., Associate Professor of Neurosurgery, East Virginia Medical School

Harold F. Young, M.D., Professor and Chairman, Division of Neurosurgery, Medical College of Virginia

### THORACIC SURGEONS

Benjamin L. Aaron, M.D., Professor of Surgery, George Washington University

Ronald P. Fischer, M.D., Director, Trauma Division, Professor of Surgery, University of Texas Medical School (Houston).

Richard G. Fosburg, M.D., Associate Clinical Professor of Thoracic Surgery, University of California, San Diego, California.

Jonathan Hill, Emanuel Hospital, Portland, OR.

James W. Pate, M.D., Professor of Surgery, University of Tennessee

William B. Long, M.D., Director of Trauma, Emanuel Hospital and Assistant Clinical Professor, Oregon Health Sciences University, Portland, OR.

### GENERAL SURGEONS

Alfred S. Gervin, M.D., Director of EMS and Trauma Services, Professor of Surgery, Medical College of Virginia.

William M. Sangster, M.D., Emanuel Hospital, Portland, OR.

Thomas L. Wachtel, M.D., Associate Clinical Professor of Surgery, University of California, San Diego

Algorithms were prepared initially by Cyometrics, Inc., 23 Ellendale Street, Suite A, Bel Air, Maryland 21014 to fulfill the terms of Navy contract N66001-85-C-0297 for the acute care of combat casualties who have sustained a penetrating injury, presuming optimal care and resources are available. Cyometrics members included William J. Sacco, Ph.D., Jane K. Melville, William J. Taylor, and John W. Jameson.

We also wish to acknowledge Michelle Haun, RN, CCRN, Trauma Program Coordinator, Joyce Cardinal, RN, CCRN, Nurse Manager, ICU, and Andrew Burnett, RN, Nurse Specialist, Operating Room, Trauma/Neurosurgery of Emanuel Hospital, Portland Oregon who assisted in preparing care provider and equipment list sections.

## CONTENTS

1	INTRODUCTION TO ALGORITHMS.....	1
2	CLINICAL TRAUMA DECISION TREES.....	6
3	HOSPITAL RESUSCITATION AND EVALUATION.....	H1
4	AIRWAY .....	A1
5	BREATHING .....	B1
6	CIRCULATION .....	C1
7	SECONDARY SURVEY MODULES .....	P1
8	BRAIN INJURY .....	BR1
9	NECK AND FACE .....	N1
10	THORAX .....	T1
11	ABDOMEN .....	AB1
12	EXTERNAL GENITALIA .....	G1
APPENDIX .....		
A. Numerical and Alphabetical Listing of Module Names		
B. Process Used in the Development of the Algorithms and Remaining Controversies		

1  
INTRODUCTION TO ALGORITHMS

William Sacco  
Jerry Linenger

The old order changeth, yielding place to new.  
[Tennyson: The Passing of Arthur]

Modern warfare poses a variety of problems for the military surgeon who is faced with the effects of low and high velocity bullet wounds and of the multiple effects of explosive devices on human organs and tissues. Few surgeons would dispute the complexity of the problem of the patient who has sustained multiple traumatic injury exhibiting a multitude of effects. Successful evaluation and resuscitation demand decisive, competent assessment and continual reappraisal of all aspects of the patient's condition.

Video tapes of resuscitations in a civilian trauma center revealed that some surgeons could not handle the stress of coordinating the resuscitation of a severely injured patient.(1) Among the inappropriate responses observed were task fixation (usually on a trivial procedure where other procedures demanded high priority), alternation (changing orders to team members where no evidence suggested the need for a change), perseveration (persisting with a treatment plan when the patient's condition demanded a change in strategy), sensory overload (partial or complete inhibition of thought and action by overwhelming horror or by the magnitude of the problem), and repetition (repeating an action over and over after an adequate initial performance).

The number of surgeons available with combat experience is decreasing with time. Also, recent testing of military physicians revealed a poor understanding of the basic concepts of military injuries and their care.(2) Hence we believe that it is imperative to develop specialized combat casualty clinical management plans which embody current civilian and military trauma management.

Protocols for diagnosis and therapy in a decision-tree or

algorithm format are efficient instruments for such purposes. Such algorithms can be definitive, comprehensive, and explicit models of trauma management and have the following additional advantages:

1. Algorithms concisely detail diagnostic sequences, and therapeutic tasks enabling medics, nurses, and physicians to update their knowledge of sophisticated casualty management rapidly.
2. Algorithms are easily communicated and may permit a few specialists to direct efficiently the care of mass casualties by less experienced personnel.
3. Algorithms provide a format whereby casualty management can be evaluated, both prospectively and retrospectively. Peer review of algorithms by experienced trauma surgeons identifies decision nodes where treatment is critical or controversial. Such nodes can be the focus of research efforts.

We believe that clinical algorithms can improve the competence, confidence, and efficiency of medical personnel in the management of combat casualties. It is conceived that a comprehensive set of penetrating wound treatment algorithms could:

1. Help trauma surgeons lacking combat experience.
2. Serve as a review or guidelines in a combat scenario.

Algorithms for the acute care (resuscitation and emergency surgery) of penetrating-injured naval combat casualties are presented. The algorithms were designed presuming that optimal personnel and resources are available, and are based on the American College of Surgeons Committee on Trauma ATLS Course, COMCINPAC trauma manuals, and the experience of surgeons with combat and civilian experience.

#### **BACKGROUND: Decision trees in medicine**

Recent years have witnessed an ever-increasing scientific contribution to the "physician's art": help with biochemical equations and electrolyte problems, modifications to diagnostic and therapeutic techniques, use of prognostic and therapeutic indices, and medical algorithms. Many non-medical professionals have applied algorithms, otherwise known as decision trees or flow charts, to their operations. Such trees can describe many simple tasks and are a help in training personnel to do a job efficiently. Medical problems do not lend themselves readily to such an approach because of rapid changes in the patient's

condition. The unpredictability of physiologic responses, the complexities of intrinsic homeostatic mechanisms, and individual differences of patients or attending physicians complicate the algorithmic approach to the subject. Despite such obstacles, significant progress has been made in the development of algorithms applicable to the treatment of medical problems.

Algorithms are the foundation of the Automated Military Outpatient System (AMOS) Program (3) and have been used in other outpatient settings to direct the activities of physician's assistants (4,5,6), physician extenders (7,8) and nurses (9). Algorithms have been developed for such clinical conditions as cardiac tamponade (10), dysuria (6), diabetes (5), hypertension (5), and for injuries of the duodenum (11) and the heart (12).

Eisman and Wotkyns (13) have edited a book containing algorithms for more than 100 surgical problems. Larson (14) has written on the use of algorithms for triage. Algorithms have been prepared for the diagnosis and management of exotic diseases (15). Champion and Sacco (16) have developed an extensive set of civilian paramedical algorithms.

Shoemaker (17) has prepared detailed algorithms for the resuscitation of injured patients. Long, Sacco, and Gill (18) have written a comprehensive set of 125 algorithms describing early resuscitation and surgery for patients with critical blunt injuries. These algorithms require frequent reappraisal of patient status and often redirect attention to higher priority problems.

Weiner and Barrett (2), in their book on trauma management, use algorithms to summarize the important concepts of injury care.

Margolis discusses many applications to teaching, audit and patient care, and gives an extensive list of references (19). Noteworthy is his statement that students read algorithms faster than prose equivalents and comprehend significantly more.

As far back as 1973 Ingelfinger (20) wrote that "the algorithm is now on every with-it tongue."

Most algorithms in clinical trauma care are simplified flow diagrams that assume a high level of clinical knowledge and experience in trauma care by the user. They presume that the diagnostics and treatment procedures prescribed will be done in a timely fashion, successfully, and without complications. The resulting algorithms do not address contingencies and tend to be simple, global, and terse.

We advocate a radical design philosophy, which calls for algorithms which presume rapidly changing clinical conditions encompassing realistic contingencies precipitated by failures to do timely maneuvers or by complications. Thus, in a patient with rapidly deteriorating vital signs, the entire management team might be suddenly redirected to higher priority problems such as reversion to resuscitation and evaluation steps.

Therefore, we presume that multiple trauma care is a highly dynamic setting and the trauma team needs to perform correctly in a timely manner. These algorithms reflect contingencies like

these:

- What happens if the member of the team cannot perform a procedure requested because of technical difficulties, inexperience, or anatomical variations?
- What happens if a member of the team inordinately "task fixates" on a procedure? Should he or she be doing an alternative procedure?
- What happens if the patient's vital signs deteriorate? Should the priorities of the team be directed toward a new set of procedures?

#### REFERENCES

1. Long, W. Private Communication.
2. Wiener, S. and Barrett, J. "Trauma Management", W.B. Saunders Co., 1986.
3. Wilson, F., Wilson, L. "Algorithm Directed Triage Manual", Reference material for a course on operational and emergency medicine. Brooke Army Medical Center, 1979.
4. Sox, H.C., Sox, C.H., and Tompkins, R.K. "The Training of physician assistants", New England Journal of Medicine: 288 (16) 818-824, 1973.
5. Komaroff, A.L., Flatley, M., et al. "Quality, efficiency, and cost of a physician assistant protocol system for management of diabetes and hypertension", Diabetes 25: 297-306, 1976.
6. Greenfield, S., Friedland, G., Scifers, S. et al. "Protocol management of dysuria, urinary frequency and vaginal discharge", Arch Intern Med 81: 452-457, 1974.
7. Vickery, D.M., Liang, M.H., et al. "Physician extenders in walk-in-clinics", Arch Intern Med 135: 720-725, 1975.
8. Greenfield, S., Bragg, F.E., et al. "Upper respiratory tract complaint protocol for physician extenders", Arch Intern Med 133: 294-299, 1974.
9. Greenfield, S., Anderson, H., et al. "Nurse protocol management of low back pain", West J Med 123: 350-359, 1975.
10. Shoemaker, W.C. "Algorithm for early recognition and management of cardiac tamponade", Crit Care Med 3: 59-63, 1975.
11. Corley, R.D., Norcross, W.J., and Shoemaker, W.C. "Traumatic injuries to the duodenum; a report of 98 patients", Ann Surg 181: 92-98, 1975.
12. Shoemaker, W.C., et al. "Hemodynamic alterations in acute cardiac tamponade after penetrating injuries of the heart", Surgery 67: 754-764, 1970.
13. Eisman, B. and Watkyns, R. "Surgical Decisions Making", W.B. Saunders, 1978.



14. Larson, K.T., et al. "Triage: A logical algorithmic alternative to a non-system", JACEP 2: 183-187, 1973.
15. Warren, K.S. and Mahamoud, A.A. (editors). "Geographic Medicine for the Practitioner: Algorithms in the diagnosis and management of exotic diseases", University of Chicago Press, 1978.
16. Champion, H.R., Sacco, W.J. "Paramedic Algorithms", Unpublished.
17. Shoemaker, W.C. "Algorithm for resuscitation: a systematic plan for immediate care of the injured or postoperative patient", Crit Care Med 3: 127-129, 1975.
18. Gill, W., Long, W.B., Sacco, W.J. "Trauma Algorithms" Shock Trauma Manual (Chapter 5), Williams and Wilkins, 1979.
19. Margolis, C.Z. "Uses of Clinical Algorithms", JAMA 249: 627-732, 1983.
20. Ingelfinger, F.J. "Algorithms, anyone?" New England Journal of Medicine, 288 (16), April, 1973.

The deep, dread - bolted thunder.  
[Shakespeare: King Lear]

The successful care of acutely injured personnel depends upon accuracy in diagnosis and speed in the implementation of therapy for immediately life threatening injuries. In all cases, survival depends on the restoration and maintenance of Airway, Breathing, and Circulation...the ABC's of primary life support. The destruction to these systems by traumatic injury means major morbidity or death for the victim. All initial trauma care focuses on the ABC's in an effort to maintain life while the clinician surveys injury to these systems first, and then secondarily surveys for less immediately life-threatening problems. A global algorithm illustrative of this principle is shown in Table 1.

In these algorithms, a system of identifying and treating life threatening injury is outlined. Initially, the focus is on those problems relating to the ABC's, branching out subsequently to specific subsets of algorithms concerning areas of the body, head, neck, thorax, abdomen, and genito-urinary tracts.

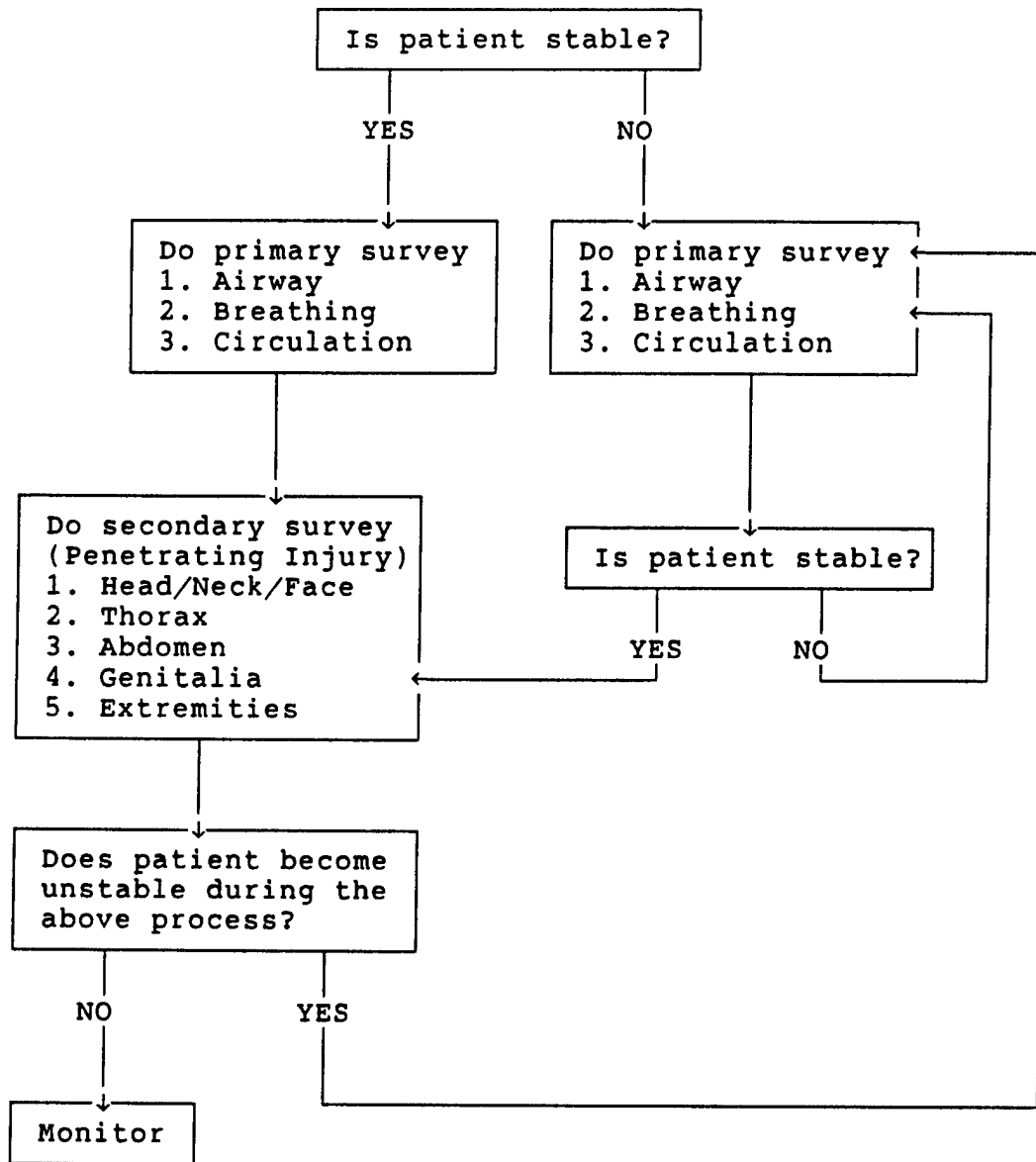
The overall design consists of two blocks of algorithms. The first block consists of recognition and evaluation algorithms which describe the trauma team performing, timely, such tasks as arterial catheterization, endotracheal intubation, thoracotomy, laparotomy, and making such diagnoses as pneumothorax, hypovolemia, and arrhythmias. In some cases, if a time constraint is not met, an alternative procedure is recommended. The algorithms also take into account complications of performing the resuscitative or diagnostic procedures.

The second block of algorithms relate to single body area wounds from fragments or bullets and the surgical management thereof. The body areas are head and neck, face, chest including shoulders, abdomen and pelvis including genitalia, and extremities.

All chapters begin with a general introduction to the materials presented, followed by case histories obtained from surgeons assigned to Operation Desert Storm medical treatment

facilities, and finally, the algorithms themselves. We conceive of the decision trees as guidelines, not gospel, for patient management. Although they are dogmatic in presentation, they are intended to be flexible in interpretation, as it is not possible to allow for all contingencies. The process used in developing these algorithms, along with remaining controversies, are presented in Appendix 2.

GLOBAL ALGORITHM



### 3 HOSPITAL RESUSCITATION AND EVALUATION

Their using all at once was as the sound of thunder heard remote.  
[John Milton: Paradise Lost]

#### A. Overview

Trauma patients frequently arrive at a definitive care facility with compromised airway and breathing problems, even though field measures have been initiated. This section was designed to handle these extraordinary problems which must be addressed before proceeding to the main body of the algorithms. The modules address creation of an airway through cricothyroidotomy or tracheostomy tube insertion or use of fiberoptic bronchoscopy to remove foreign bodies in the airway.

#### B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.

5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest.  
Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:  
CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you.]

### C. Decision Trees

## HOSPITAL RESUSCITATION &amp; EVALUATION ALGORITHM SERIES

Key to specialty codes: A - Surgeon;  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Remove cricothyroidotomy or tracheostomy tube while assistant presses on wound	3	3	1*	1*	1*	No equipment needed
2. Replace tube with 7.0 or 7.5 tracheostomy tube	3	3	1*	1*	1*	7.0 or 7.5 tracheostomy tube
3. Ventilate patient with bag-valve-tube technique with 100% O <sub>2</sub> @ 20 breaths/min			3	2	1	O <sub>2</sub> source; O <sub>2</sub> tubing; AMBU bag; stethoscope; ventilator
4. Secure tube	3	3	2*	2	1	Tape; Benzoin ointment; gauze
5. Insert bronchoscope through tracheostomy or endotracheal tube	3	3				Fiberoptic bronchoscope; saline lubricant
6. Suction secretions through bronchoscope	3	3				Suction source; suction tubing
7. Remove foreign body	3	3				Oral airway; suction device suction tubing and kit
8. Withdraw tube until tip is above carina	3	3				No equipment needed
9. Withdraw tube over bronchoscope	3	3				No equipment needed
10. Reinsert bronchoscope tip into tracheal lumen and direct tip toward carina	3	3				No equipment needed
11. Reinsert tube over bronchoscope into trachea and place tip 3 cm above carina	3	3				No equipment needed
12. Do anterior lateral thoracotomy	3	3				Thoracotomy list
13. Start an IV	3	3	2	2	2	#14, #16, #18 gauge; alcohol wipes; 4 X 4's; 2 X 2's; tubing with I.V. solution

\*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*  
In all cases, the specialty surgeon is a thoracic surgeon.  
In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.  
Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

14. Give norcuron 0.1 mg/kg IV	3	3	3	2	1	Norcuron or other agent; syringe alcohol wipes; patent I.V.
15. Insert rigid bronch- oscope and remove foreign body	3	3				Rigid bronchoscope; saline; lubricant
16. Reinsert tracheostomy tube	3	3				No equipment needed



CARDIO VASCULAR TRAY

BOTTOM LAYER

-----  
#7 KNIFE HANDLE  
STRULLY SCISSOR  
POTTS SCISSORS - 25, 45, 60 DEG  
NARROW TIP SUTURE SCISSOR

SECOND LAYER

-----  
30 DEG PERIPHERAL CL (BLACK)  
ACUTE ANG MINATURE CLAMPS  
STR ATRAGRIP CLAMPS  
30 DEG DEBAKEY MINATURE CLAMPS  
LONG ALLISES

THIRD LAYER

-----  
LONG ATRAGRIP TISSUE FCPS  
MED ATRAGRIP TISSUE FCPS  
SH ATRAGRIP TISSUE FCPS  
LONG FINE TIPPED N.H.  
MED N.H.  
SH FINE TIPPED N.H.

FOURTH LAYER

-----  
TANGENTIAL OCCLUSION CL (LG ANG  
SATINSKY)  
SEMB CLAMP  
KIDNEY PEDICLE CLAMP

CHEST SET (THORACIC) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
MEDIUM NEEDLE BOLDERS  
LONG NEEDLE HOLDER -NOT FINE  
SPONGE STICKS  
LONG CURVES  
LAUERS  
TONSILS  
ROCKERS - CLAMP  
BABCOCK CLAMP  
ALLIS CLAMP  
CURVED CRILER  
CURVED MOSQUITOES CLAMP  
SUTURE SCISSORS  
MAYO SCISSORS  
METZ SCISSORS  
LONG METZ SCISSORS

CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.B.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
TONSILS  
MEEKER  
KIDNEY PEDICAL CLAMP  
REGULAR RUMELS  
REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR  
PEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES  
#3 LONG KNIFE HANDLE

# LAPAROTOMY EQUIPMENT LIST A

## SUTURE

SILK 2-0 STRAND  
SILK 3-0 STRAND

## STICK TIES

SILK 2-0 SH  
SILK 3-0 SH

## CLOSURE

VICRYL 0 CT  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES SM-35W

## DRAPES & PACKS

MAJ. BASIN/GRADUATE W/  
MED. CUP 60CC  
LAPAROTOMY SHEET  
BACK TABLE COVER  
TOWELS, STERILE (6)  
MAYO STAND COVER  
GOWN, STERILE XIR. LRG. (3)  
SKIN PREP TRAY  
MEDIUM SHEET 44 X 60"

## SPONGES

LAP. 18 X 18 (3)  
4 X 4 X-RAY DETECT  
CYLINDRICAL DISSECTOR'S

## CAUTERY

GROUNDING PAD  
ELECTRO-CAUTERY HAND PENCIL  
CAUTERY MACHINE  
CAUTERY EXTENTION BLADE

## CATHETER

CATH. PLUG  
FOLEY CATH. TRAY  
FOLEY CATH. 16FR. THERMAL  
URIMETER DRAINAGE BAG

## GLOVES

EXAM, UNSTERILE  
SURGEONS, STERILE  
SURGEONS HYPO-ALLERG., STERILE

## SOLUTIONS

IRRIG. WATER 1500CC  
IRRIG. NACL 1000CC

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
BLADE, SURGICAL #21  
CACRON TAPE  
HEMOCLIP, SMALL  
HEMOCLIP, MED.  
HEMOCLIP, LRG.  
RAZOR, PROP  
MAGNETIC NEEDLE MAT  
SUCTION TUBING 20'

## INSTRUMENTS & EQUIPMENT

LAPAROTOMY SET  
EXTRA LONG INSTR.  
RETR. UPPER HAND  
BOSEL CLAMPS  
HEADLIGHT, FIBEROPTIC  
DEEP BALFOR

## DRAINS

PENROSE 1" X 36"  
JACKSON PRATT, 7MM & 10MM  
JACKSON PRATT RESERVOIR  
CATH. MALCOTT 22GR.  
CATH. RED RUBBER 14FR.

## HAVE AVAIL. INTERNAL STAPLES

TA 30,55,90. - 3.5MM & 4.8MM  
TA 30,55,90/ - 3.5MM & 4.8MM  
GIA MULTI USE UNIT & GUN  
POWERED PLDS-15W

## DRUGS

CEFADYL 1GM.  
THROMBIN 10,000U

## SYRINGE

SYRINGE, 30CC LL  
SYRINGE, 60CC LL  
SYRINGE, 10CC LL  
SYRINGE, 60 CC SLIP TIP

## COLOSTOMY BAG

COLOST/TLEOST FLNG, 100MM X 4"  
COLOST/TLEOST FLNG, 70MM X 4"  
LOOP OSTOMY, 100MM  
LOOP OSTOMY, 70MM

## DRESSINGS

TELFA  
GAUZE, 4 X 8"  
ABD. STERILE

LAPAROTOMY LIST B EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

2 ARMY/NAVYS  
2 SHARP RAKES  
1 WIDE MALLEABLE  
1 NARROW MALLEABLE  
1 WIDE DEAYER  
1 NARROW DEAYER  
1 LARGE RICHARDSON  
1 MEDIUM RICHARDSON  
1 SMALL RICHARDSON  
1 WIDE HARRINGTON  
1 NARROW HARRINGTON  
1 BALFOUR  
2 TONSIL SUCTIONS  
6 BALL CLIPS

PEEL PACK:  
-----

4 REGULAR TOWEL CLIPS  
2 #3 KNIFE HANDLES  
1 #4 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
1 LONG THUMBS WITHOUT TEETH  
2 LONG RUSSIANS  
2 FINE GYNES  
2 ADSONS WITH TEETH  
2 LONG ATRAGRIPS  
1 POOL SUCTION

WRAP IN TOWEL:  
-----

2 MEDIUM HEMOCLIP APPLIERS - LONG  
  
2 MEDIUM NEEDLE HOLDERS  
2 LONG NEEDLE HOLDERS - NOT FINE  
2 SPONGE STICKS  
4 LONG CURVES  
4 LAUERS  
4 TONSILS  
4 ROCKERS  
2 BABCOCKS  
4 ALLISES  
10 CURVED CRILES  
4 CURVED MOSQUITOES  
1 SUTURE SCISSOR  
1 MAYO SCISSOR  
2 METZ SCISSORS  
1 LONG METZ SCISSOR

# THORACOTOMY LIST

## SUTURE

SILK A-306H 0 STRAND  
SILK BA-75H 2-0 STRAND  
SILK BA-74H 3-0 STRAND

## STICK TIES

SILK K-33H 2-0  
VICRYL J-833H 2-0 SH  
SILK K-832H 3-0  
CHROMIC G-122H 3-0 SH

## BROWCHUS

VICRYL J-304H 4-0 RB-1 (use with  
2-0 silk strand for chest  
tube skin stitch)  
NEEDLE 3/8 CUTTING 2090-14

## OR

SILK 737G 2-0 X-0

## CLOSURE

VICRYL J-849G 2 TP-1  
MAXON 2-0 T-25 OR 628751  
MAXON 3-0 T-25 6287-41

## SKIN (ASK)

PDS Z-422H 4-0 FS-2  
STAPLE, LOADING UNIT SM-35W  
STAPLE GUN, SKIN

## PACKS AND DRAPES

PACK, BASIC  
BASIN, MAJOR  
BASIN, STANDARD SINGLE SET  
TRAY, SKIN SCRUP SURGERY  
COVER, MAYO STAND 8337  
SHEET, TRANSVERSE LAP  
GOWN, STER BACK XL A9541  
GOWN, STER BACK LAG A9511  
CLOTH DRAPE (SINGLE)  
TOWELS, STERILE (8 PK)

## FOLEY CATHETERS --ASK FIRST

TRAY, CATH FOLEY UNIVERSAL  
CATHETER, FOLEY W/T SENS 16FR3C  
URINETER, DRAIN BAG

## CAUTERY

CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, ELECTROSWITCH HANDSWITC  
MOVIE HOLDER  
ELECTRODE, BLADE EXTENDED( ARGON  
BEAM MACHINE AVAILABLE)  
ARGON BEAM PAD  
ARGON BEAM TIP

## SPONGES

SPONGES, CYLINDRICAL DISSECTORS  
SPONGE, LAP 12 X 12  
SPONGE, LAP 18 X 18  
SPONGE, GAUZE X-RAY DETECT

## SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

## SOLUTIONS

SOLUTION, IRRIG WATER 1500ML  
SOLUTION, IRRIG NAACL 1000

## MISCELLANEOUS SUPPLIES

BLADE, SURGICAL #21  
BLADE SURGICAL #10 024760  
BLADE, SURGICAL #15  
BONE WAX W-31G  
DACRON TAPE 8618-00  
DRAPE, IOBAN 6648  
HEMOCLIP, MED  
HEMOCLIP, LRG  
MAGNETIC INSTRUMENT MAT  
MAGNETIC NEEDLE MAT AVAILABLE  
RAZOR, PREP DISP  
VESSEL LOOPS MAXI RED  
VESSEL LOOPS MINI YELLOW

## DRAINS

TUBE, CHEST 28FR THORACIC  
TUBE, CHEST 32FR THORACIC  
TUBE, CHEST 36FR THORACIC  
PLEUREVAC, ADULT

## INSTRUMENTS AND EQUIPMENT

CHEST SET  
LAPAROTOMY SET  
LUNG SPATULA  
BRANDAG/"U" SHAPED VAC PAC  
CARDIO VASCULAR TRAY  
HEADLIGHT  
LIGHT HANDLES, BLUE RIGID (2)  
CRYO UNIT  
SCISSOR, METE, LONG FINE  
APPLIER, HEMOCLIP, LARGE, LONG

(HAVE AVAILABLE)

FCP, ATRAGRIP, LONG  
CLAMP, COARCTATION  
N H, EX. LONG  
RETR, MOORSE, STERNAL  
RETR, HIMMELSTEIN  
CLAMP, THORACIC ANEURYSM  
DRESSINGS

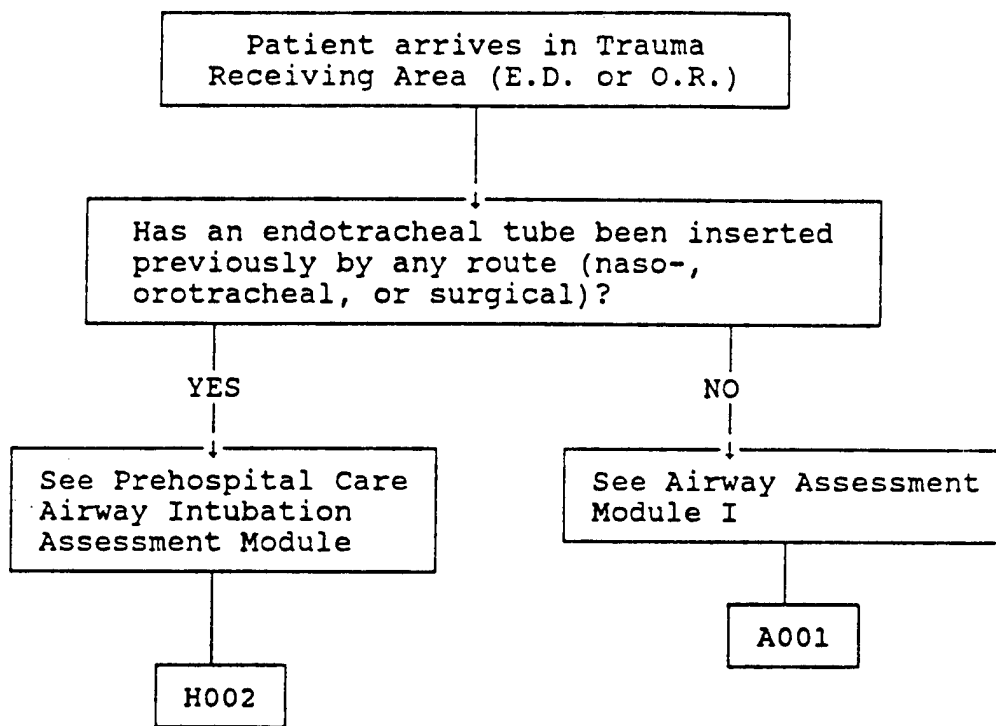
DRESSING, TELPA  
DRESSING, GAUZE 4 X 8 12 PLY  
PAPER TAPE

TRAUMA CHEST TRAY - Minimal equipment

-----

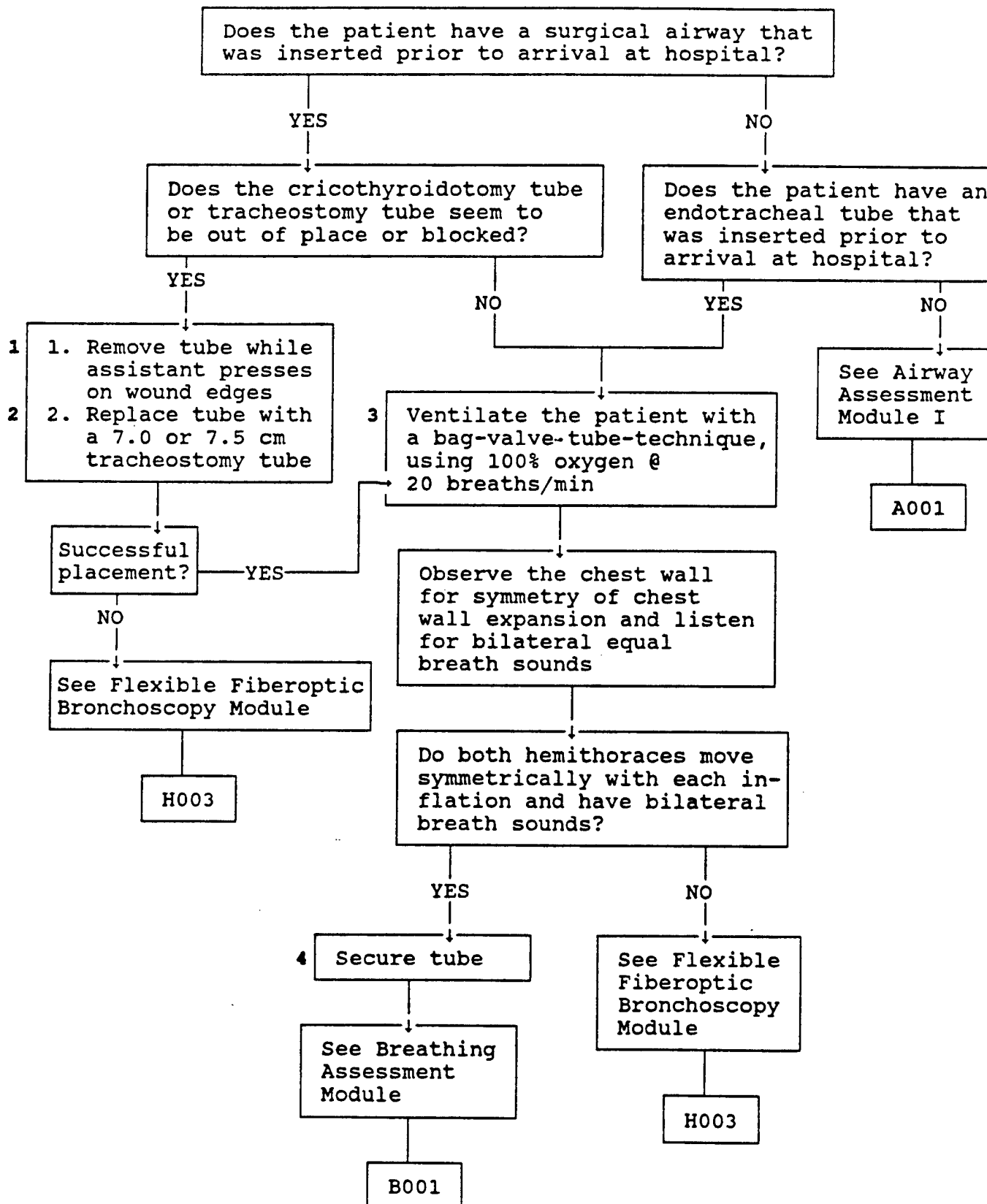
- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
  - STERNAL SAW/LEBSCHKE
  - BETADINE PREP
  - SUTURE FOR REPAIR
  - SUCTION
  - CHEST TUBES
  - DRAINAGE SYSTEM

HOSPITAL  
RESUSCITATION & EVALUATION  
ALGORITHM SERIES

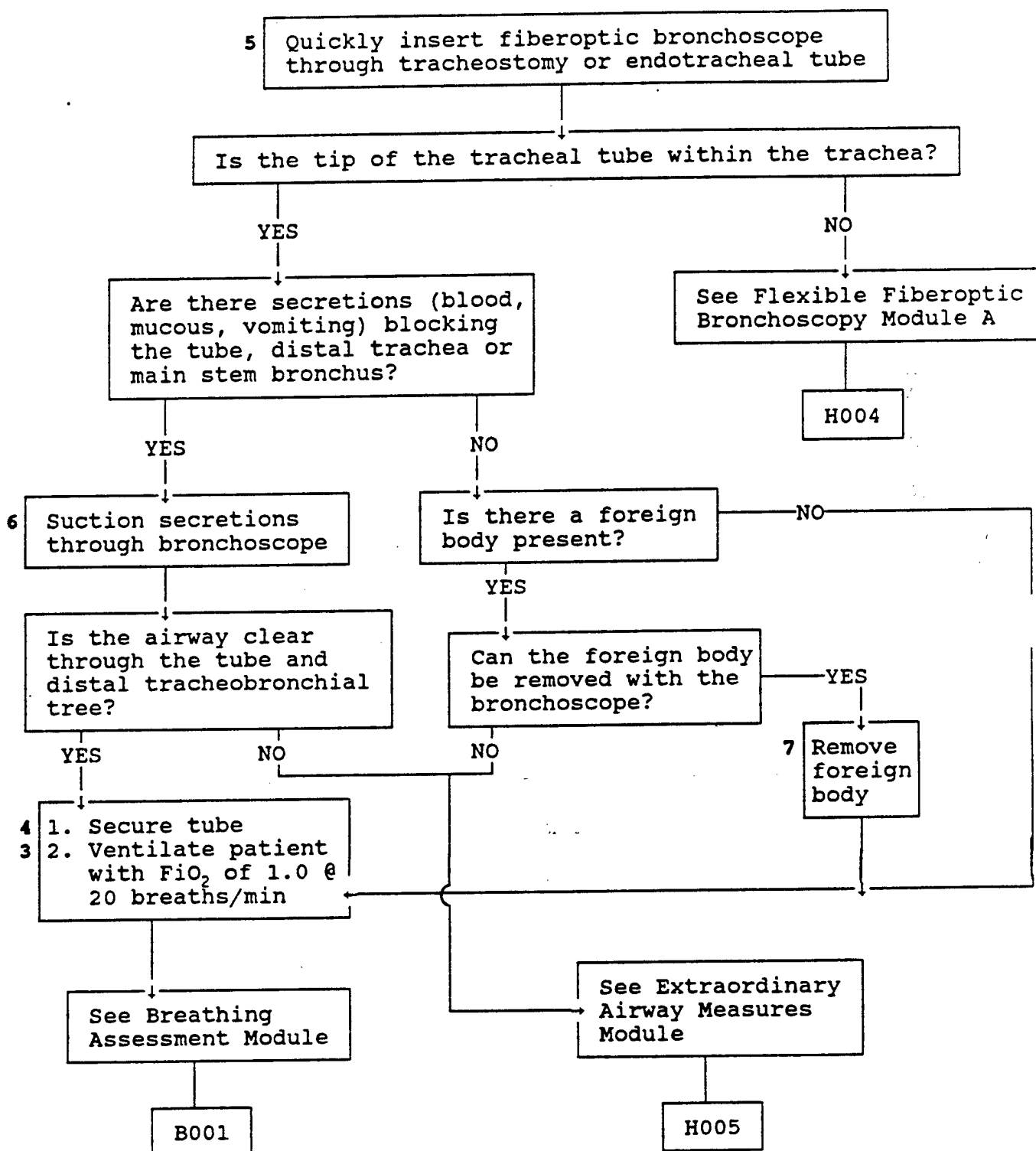




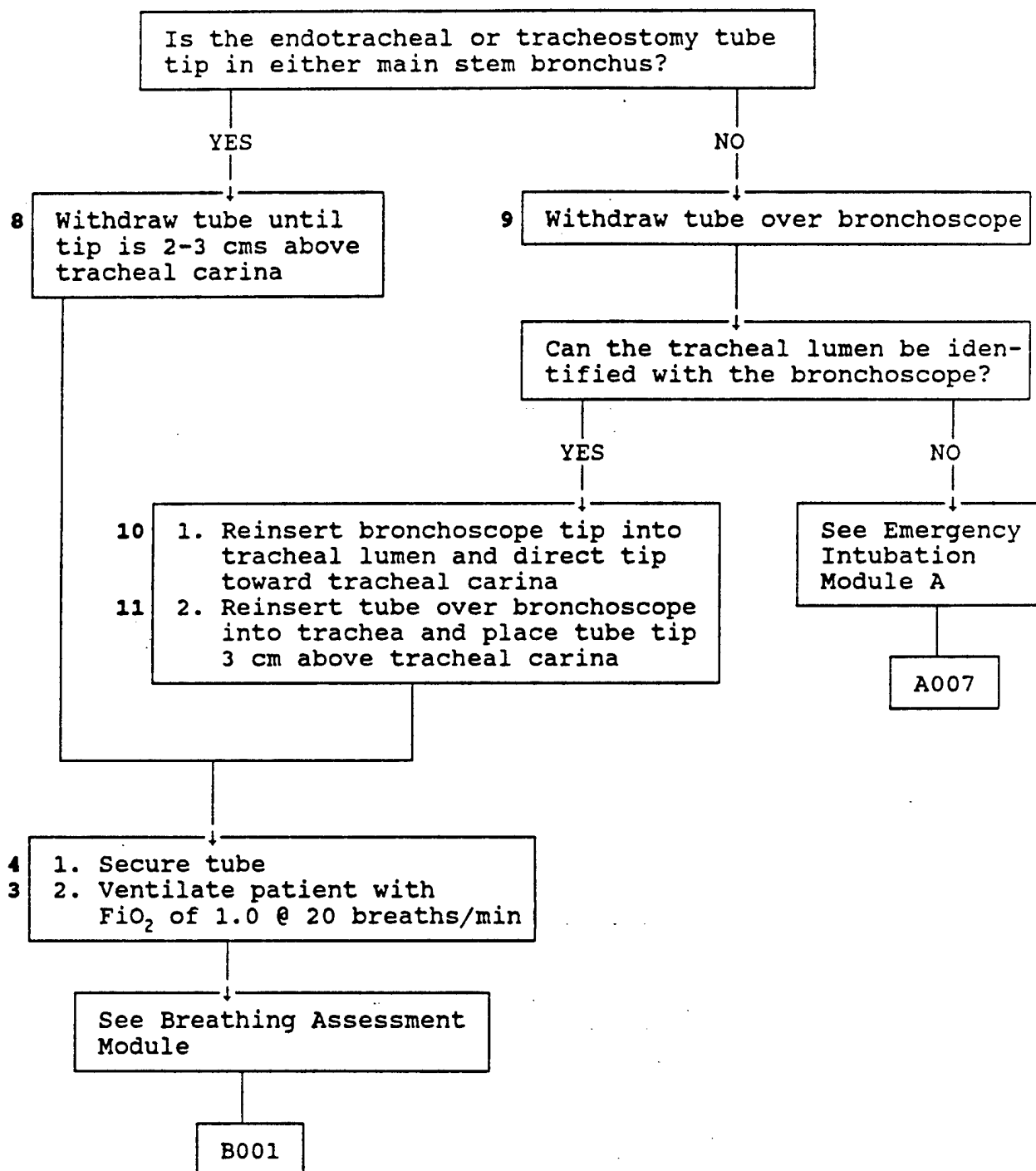
PREHOSPITAL CARE AIRWAY  
INTUBATION ASSESSMENT MODULE



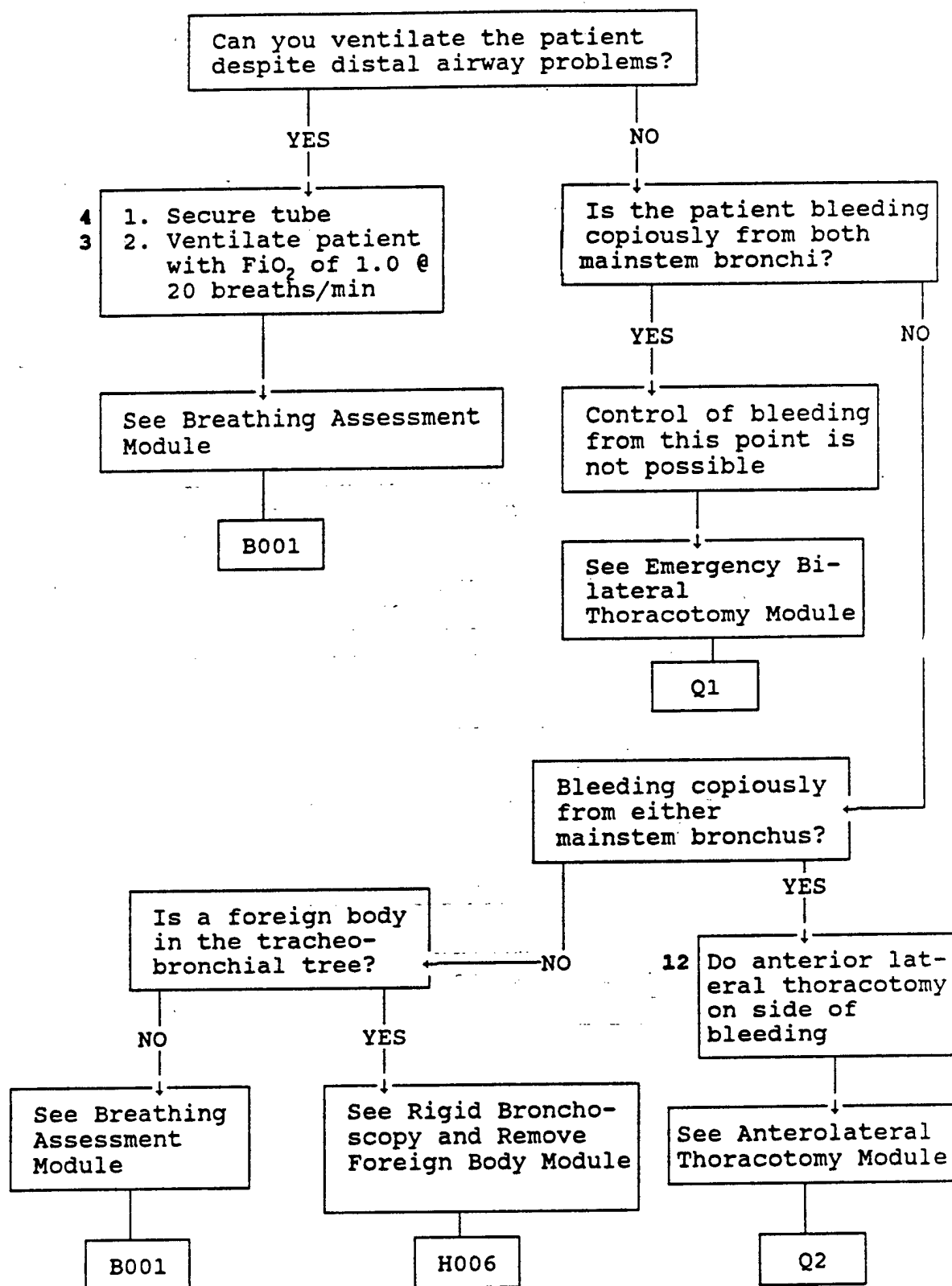
FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE



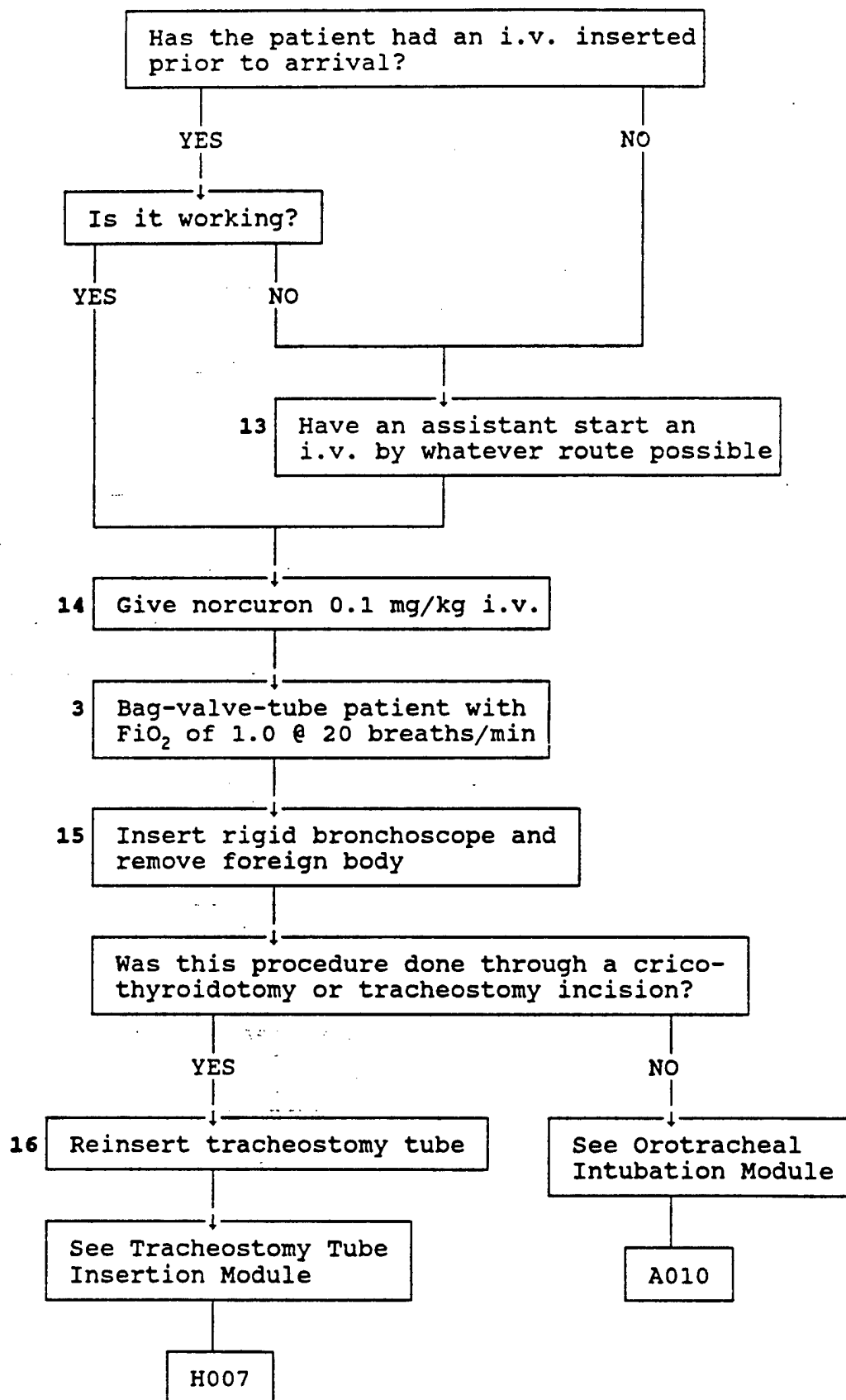
FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE A



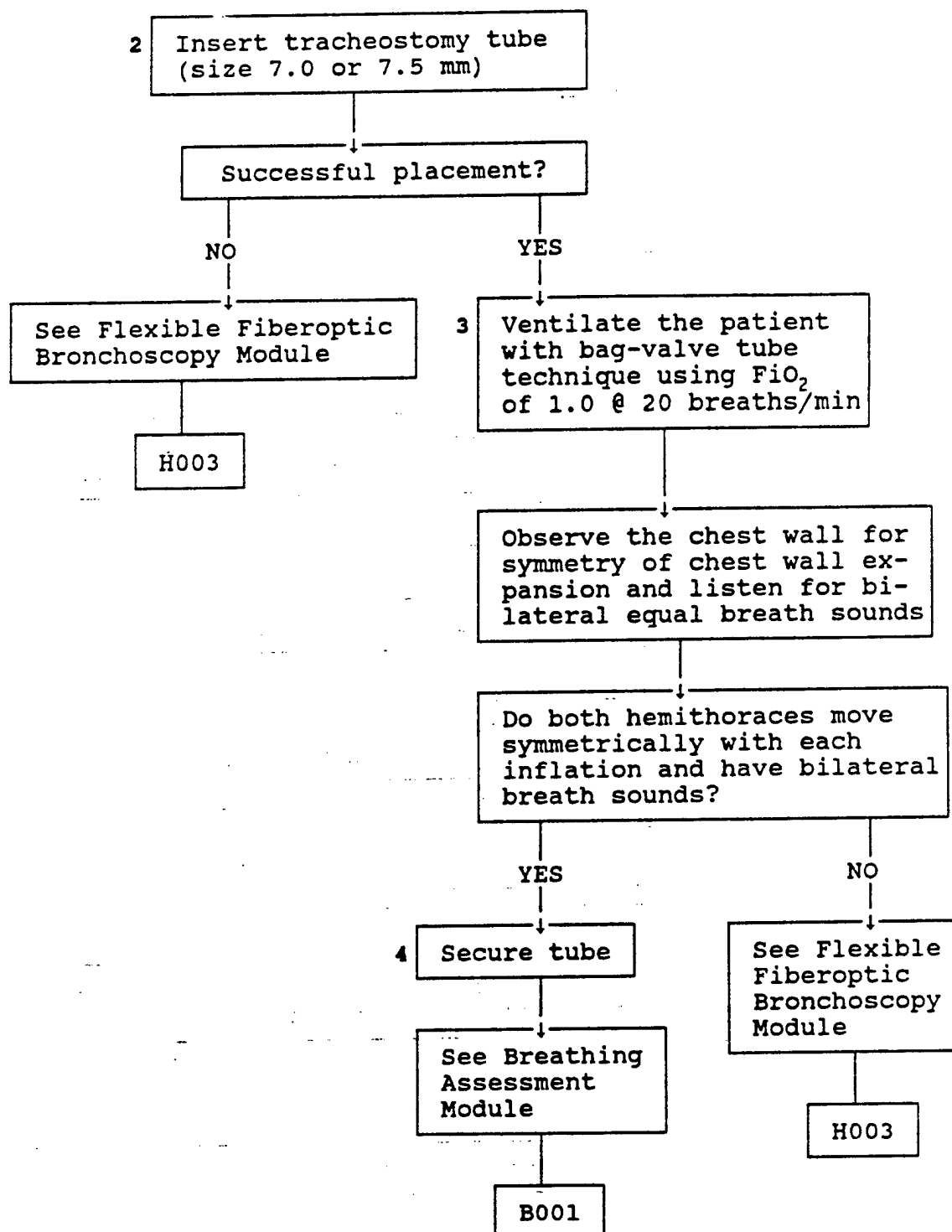
EXTRAORDINARY AIRWAY MEASURES MODULE



RIGID BRONCHOSCOPY AND REMOVE FOREIGN BODY MODULE



TRACHEOSTOMY TUBE INSERTION MODULE



4  
AIRWAY

In a good surgeon, a hawk's eye and lions heart:  
and a lady's hand.

[Leonard Wright: Display of Duties]

**A. Overview**

Establishing and maintaining an airway is the first step in trauma resuscitation. Without an adequate oxygen and carbon dioxide exchange, a patient will die. It is the role of the trauma team to rapidly diagnose and manage mechanical obstruction or airway discontinuity first.

Airway problems may be due to injury to the oropharynx, larynx or trachea, or related to head injury with loss of consciousness, foreign body problems, or extrinsic compression. Algorithms in this section focus on the patient's ability to breathe with minimal assistance, and if not, move quickly to establishing appropriate and secured airways by intubation, tracheostomy or cricothyroidotomy. Once the critical airway is established, the resuscitation team can proceed to the next level of primary care, that of breathing.

**B. Operation Desert Storm Case Reports**

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.

Striking him in the L groin region . . .

4. Presentation to the hospital ship/field hospital. He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
  5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest.  
Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
  6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
  7. Any other "pearls" or difficulties you'd like to discuss.
  8. Your name, unit, overseas address, permanent address and phone number (not required).
- CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]



### **C. Decision Trees**

# AIRWAY - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1 Administer O <sub>2</sub> by mask at 10 L/min	3	3	3	2	1	O <sub>2</sub> mask; O <sub>2</sub> tank
2 Establish I.V.	3	3	3	2	2	#16, #18 gauge I.V. catheters; alcohol wipes; tape; 4X4's; 2X2's; tubing with I.V. solution; prep solution
3 Infuse normal saline			3	2	1	Normal saline; I.V. tubing; established I.V. line
4 Give 0.1 mg/kg I.V. Norcuron			3	2	1	Patient must be ventilated and intubated - syringe; alcohol wipes; Norcuron or other agents; patent I.V.
5 Bag-valve-mask patient with 100% O <sub>2</sub> @ 20 breaths/min			3	2	1	Bag-valve-mask; O <sub>2</sub> source; O <sub>2</sub> tubing
6 Insert oral airway			3	2	1	Appropriate size of oral airway; suction device; suction tubing and kit
7 Remove foreign body in hypopharynx or oropharynx	3	3	3	2	1	Oral airway; suction device; suction tubing and kit
8 Orotracheal intubation	3	3	3			Endotracheal tubes; tape; viscous Lidocaine; drugs for sedation
9 Nasotracheal intubation	3	3	3			Endotracheal tubes/stylet; lubricant; tape; syringe; Laryngoscope; magill forceps; stethoscope; suction/suction source; viscous Lidocaine
10 Secure ET tube	3	3	3	2	1	Tape; Benzoin ointment; gauze
11 Sellick Maneuver	3	3	3	2	1	No equipment needed
12 Inflate endotracheal tube cuff	3	3	3	2	1	Syringe
13 Attach AMBU bag to ET tube and ventilate			3	2	1	AMBU bag; O <sub>2</sub> source; O <sub>2</sub> tubing
14 Cricothyroidotomy	3	3	2*	1*	1*	Curved hemostat; Endotracheal tube/trach tube (5-7mm) O <sub>2</sub> source; AMBU bag
15 Tracheostomy	3	3				#15, #11 knife blade/handle; scalpel; scissors; Bovie with needle tip; tracheostomy tube or wire endotube; See trauma tray. 3-0 silk suture ties; zylocaine with needle; prep solution; trach hook; spreaders

## \*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

In all cases, the specialty surgeon is a thoracic surgeon.

In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.

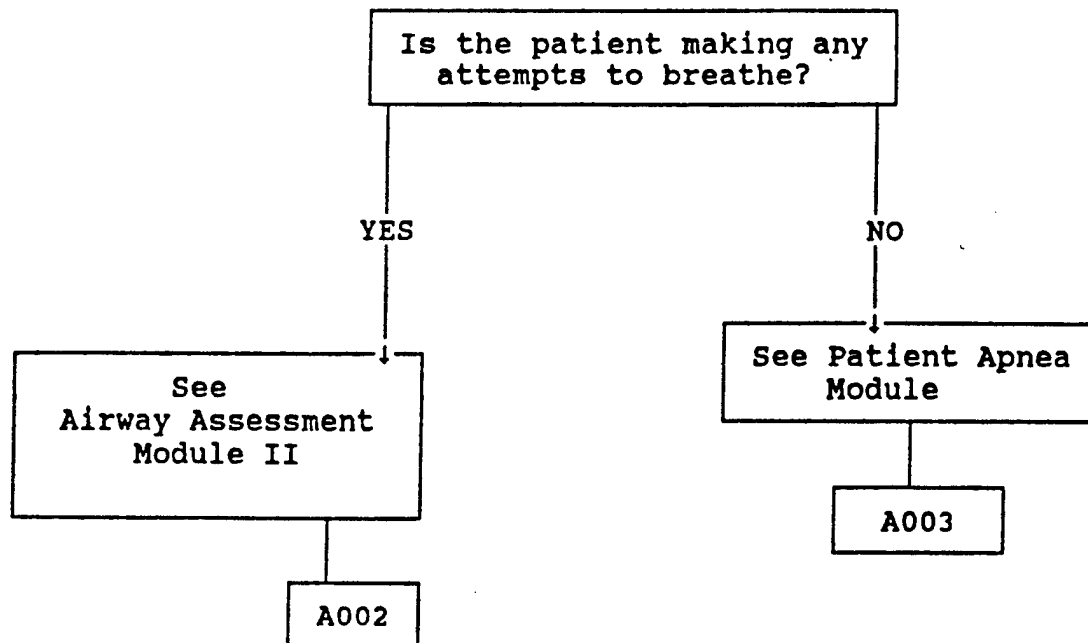
Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

16 Secure tracheostomy tube	3	3	1	1	1	Surgical tape; suture with needle 2.0 silk; surgical tape
17 Suture anterior jugular veins	3	3	2			Suture; 4.0 vicryl; needle holder; scissors
18 Insert bronchoscope into NT tube	3	3	3			Bronchoscope machine; scopes; sterile water or saline
19 Suction trachea tube	3	3	3	3	1	AMBU bag; O <sub>2</sub> source; normal saline for irrigation; gloves; mask

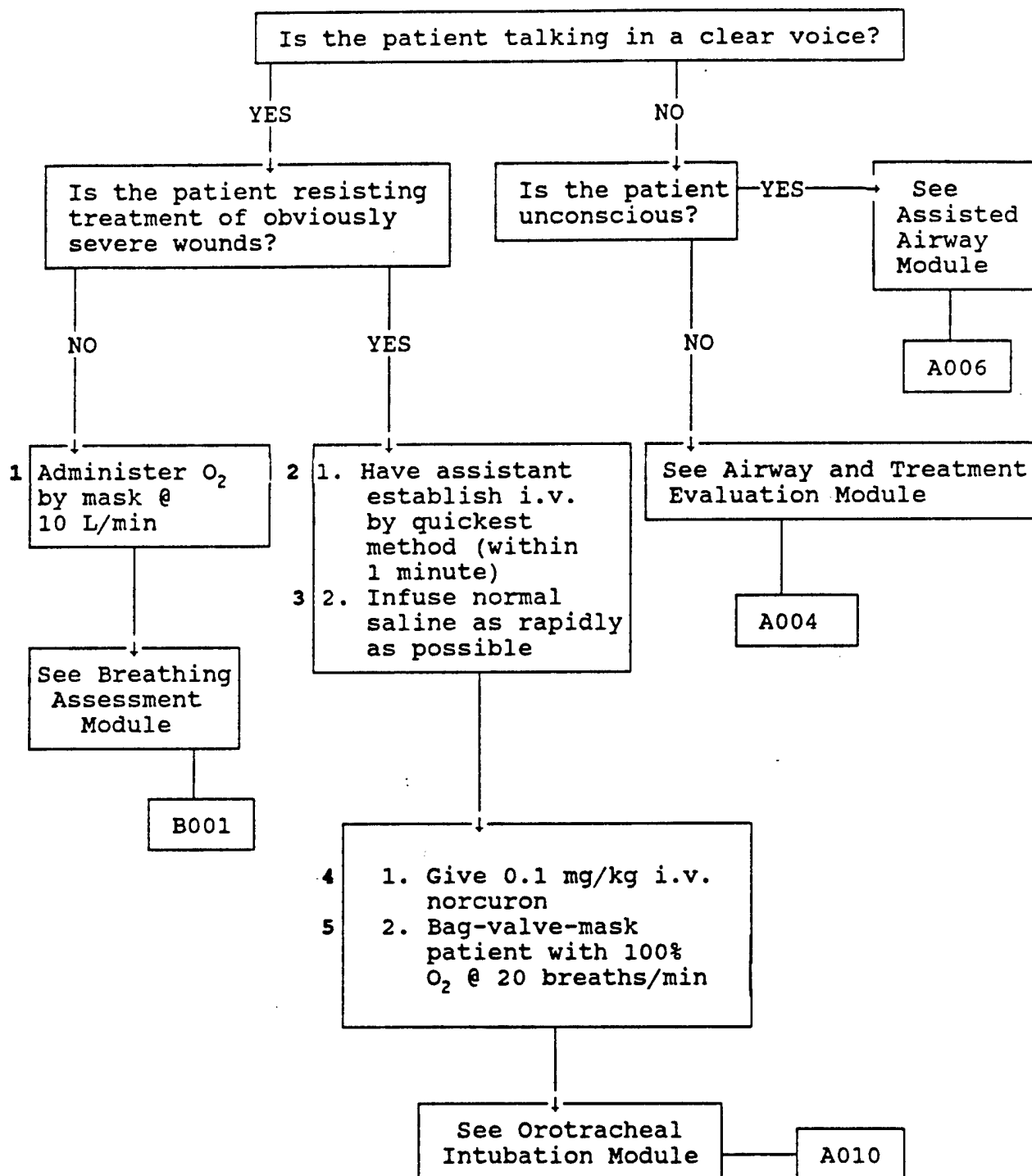
TRAUMA CHEST TRAY - Minimal equipment

---

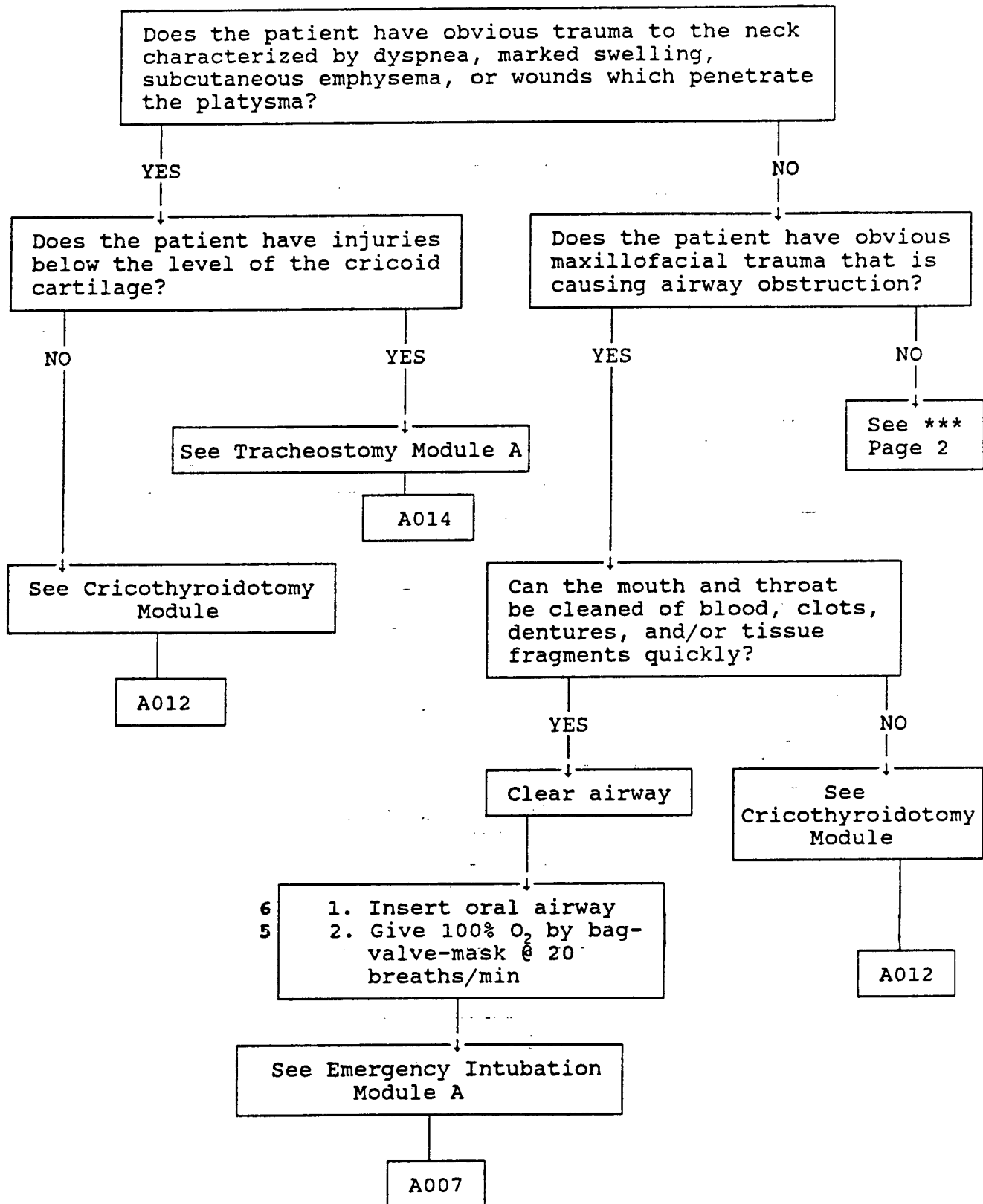
- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
- STERNAL SAW/LEBSCHKE
- BETADINE PREP
- SUTURE FOR REPAIR
- SUCTION
- CHEST TUBES
- DRAINAGE SYSTEM

AIRWAY ASSESSMENT MODULE I

AIRWAY ASSESSMENT MODULE II



PATIENT APNEA MODULE

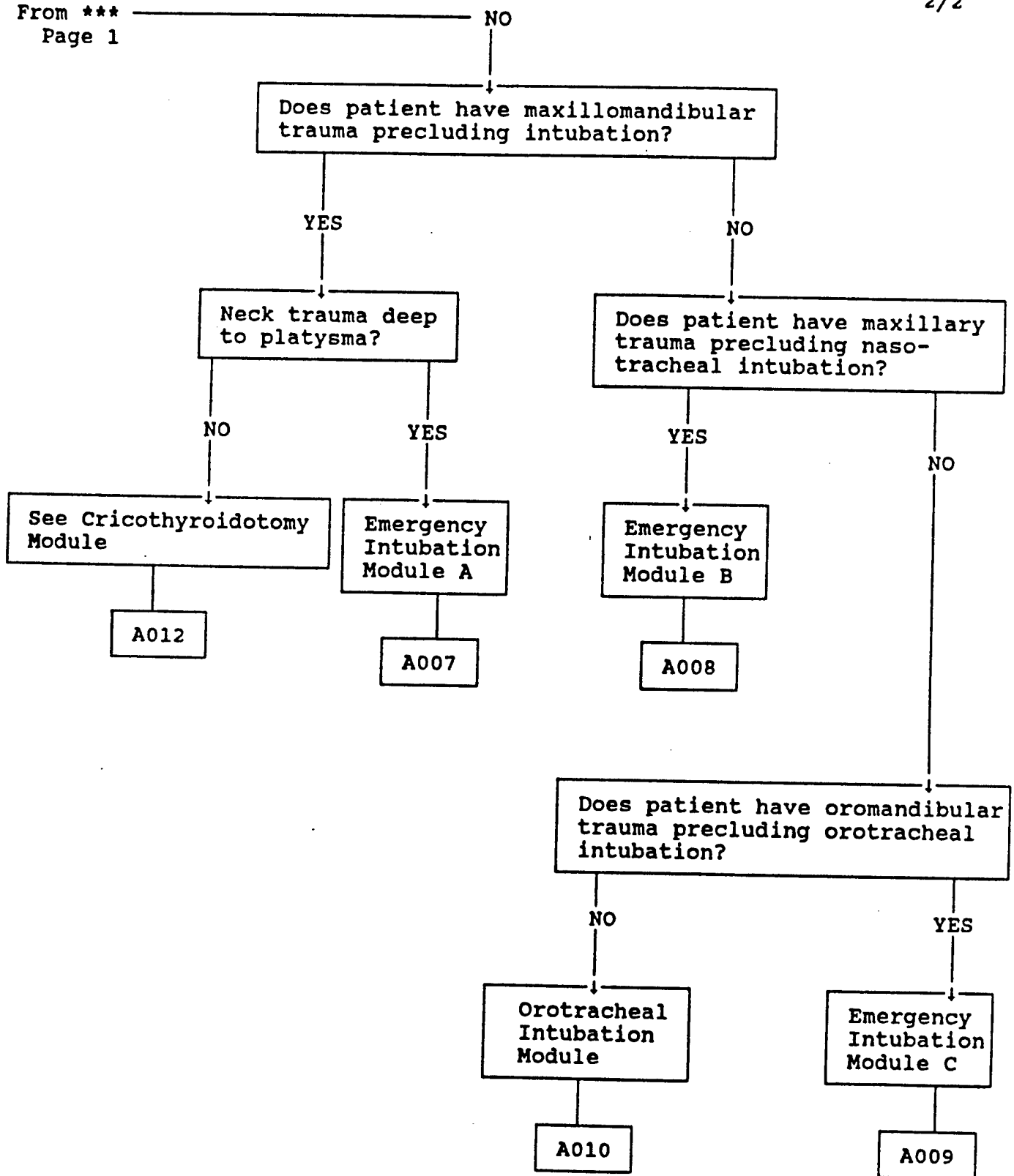


PATIENT APNEA MODULE

A003

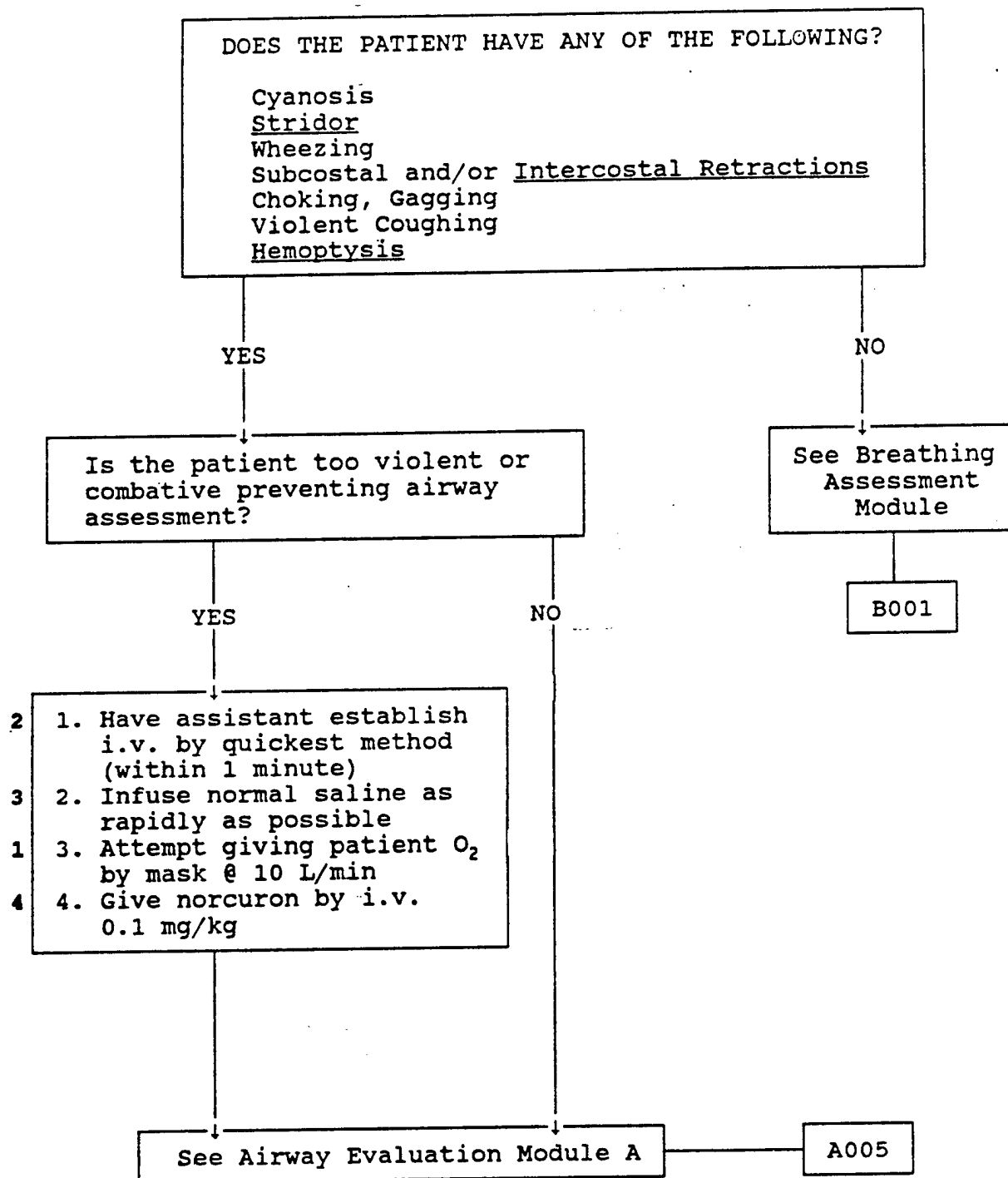
2/2

From \*\*\*  
Page 1

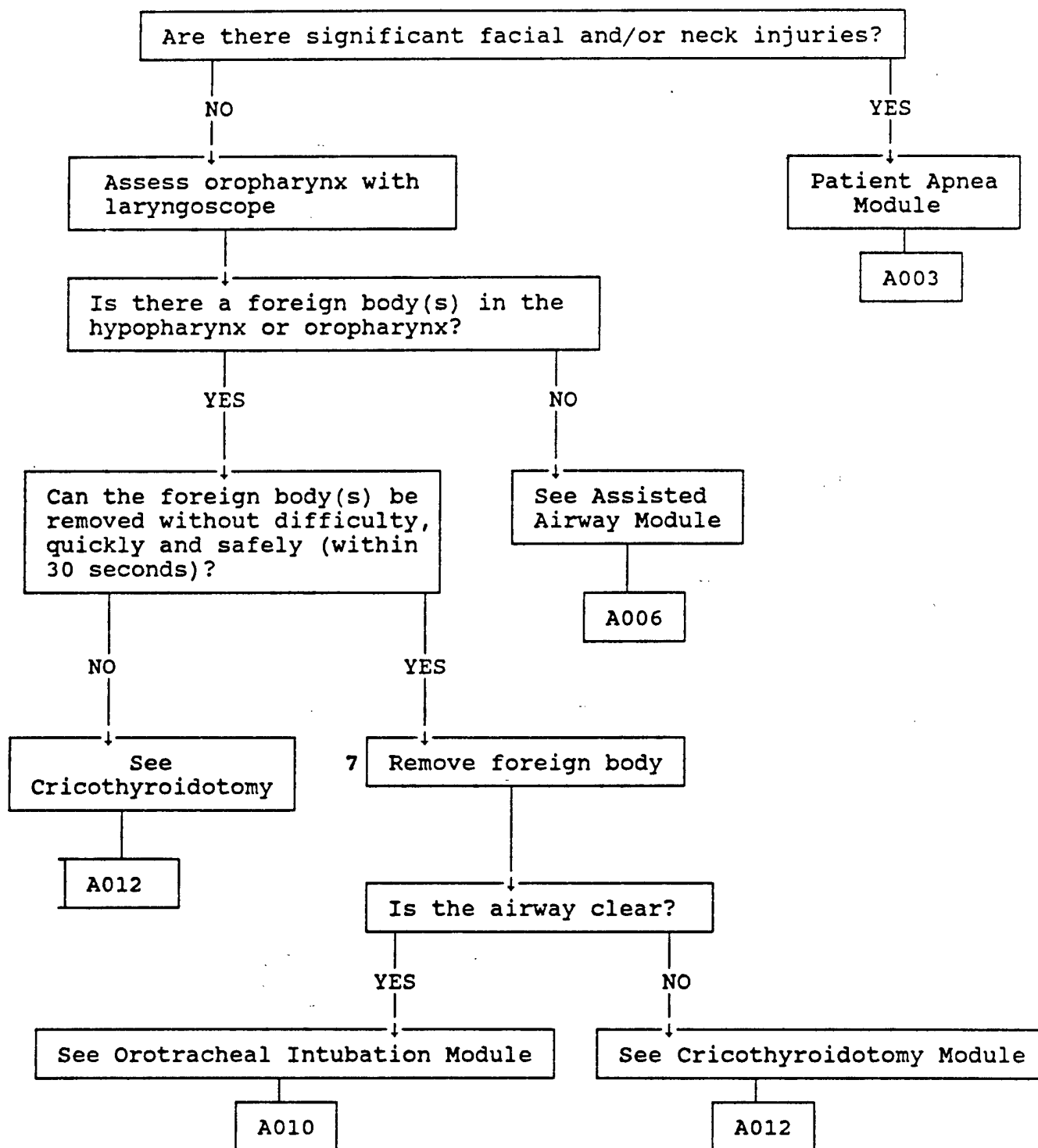




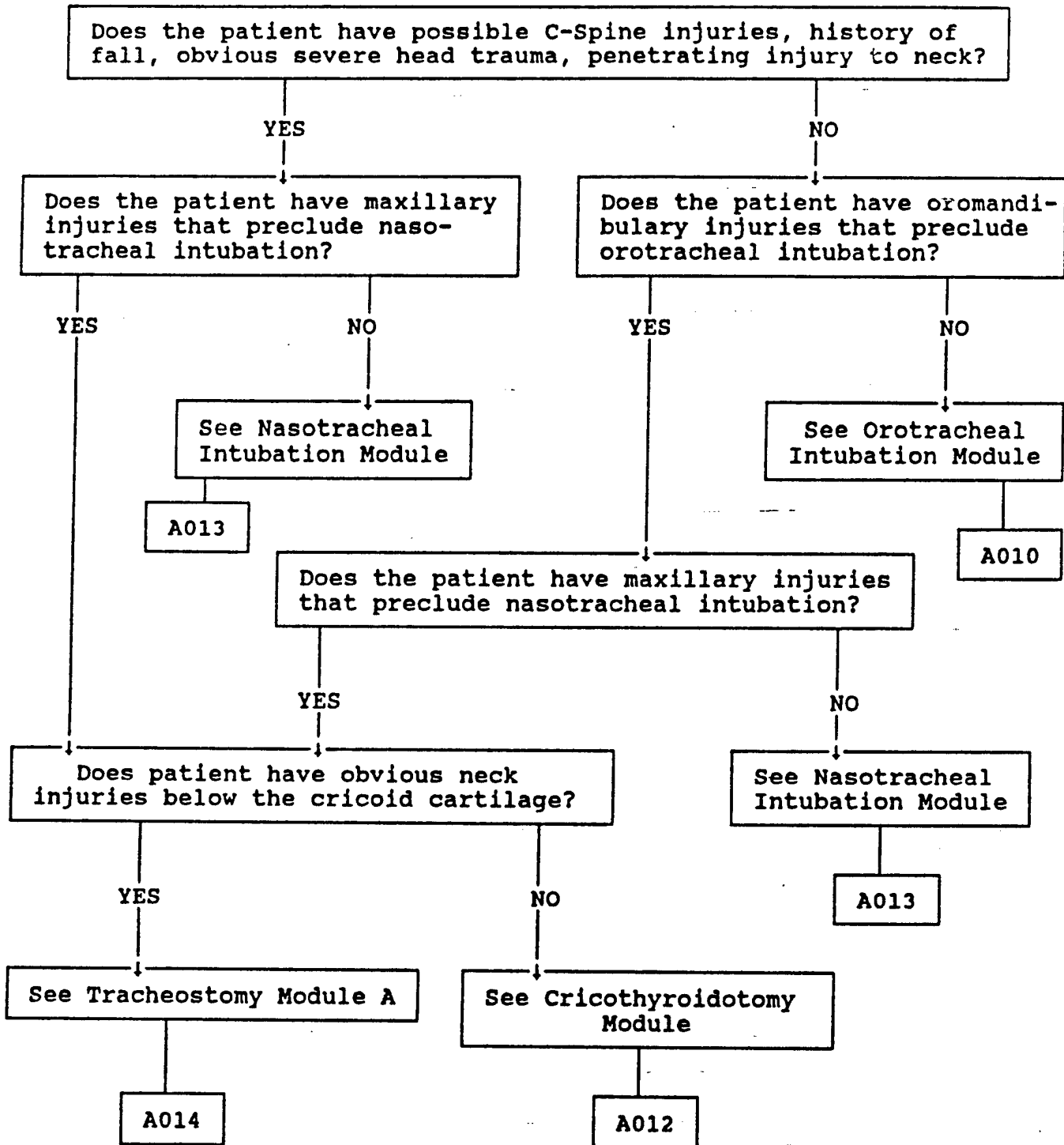
AIRWAY AND TREATMENT EVALUATION MODULE



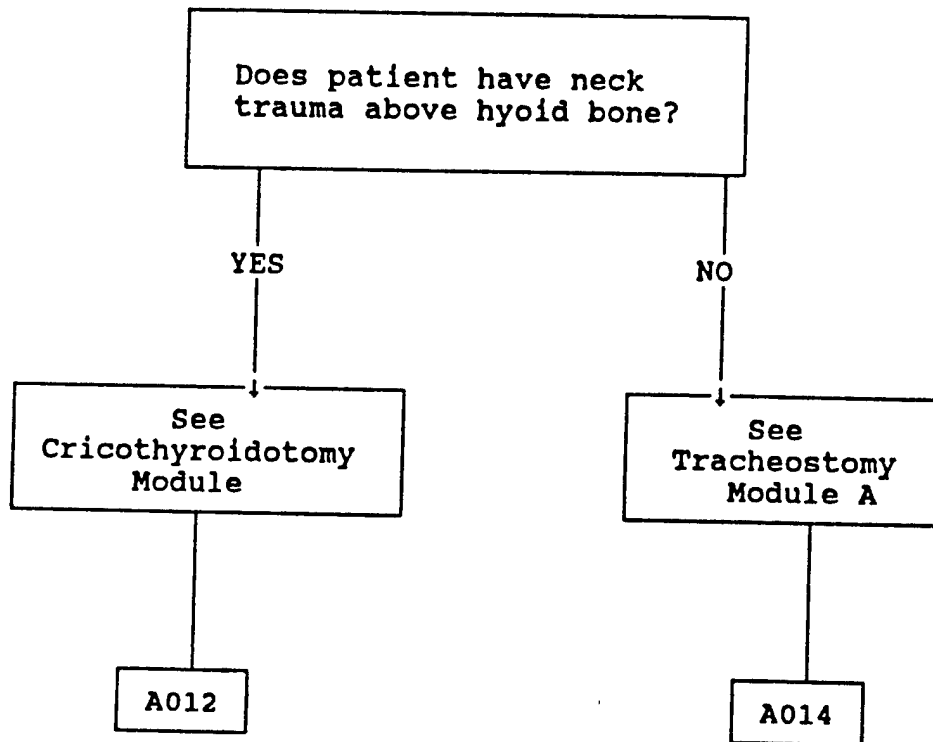
AIRWAY EVALUATION MODULE A



# ASSISTED AIRWAY MODULE

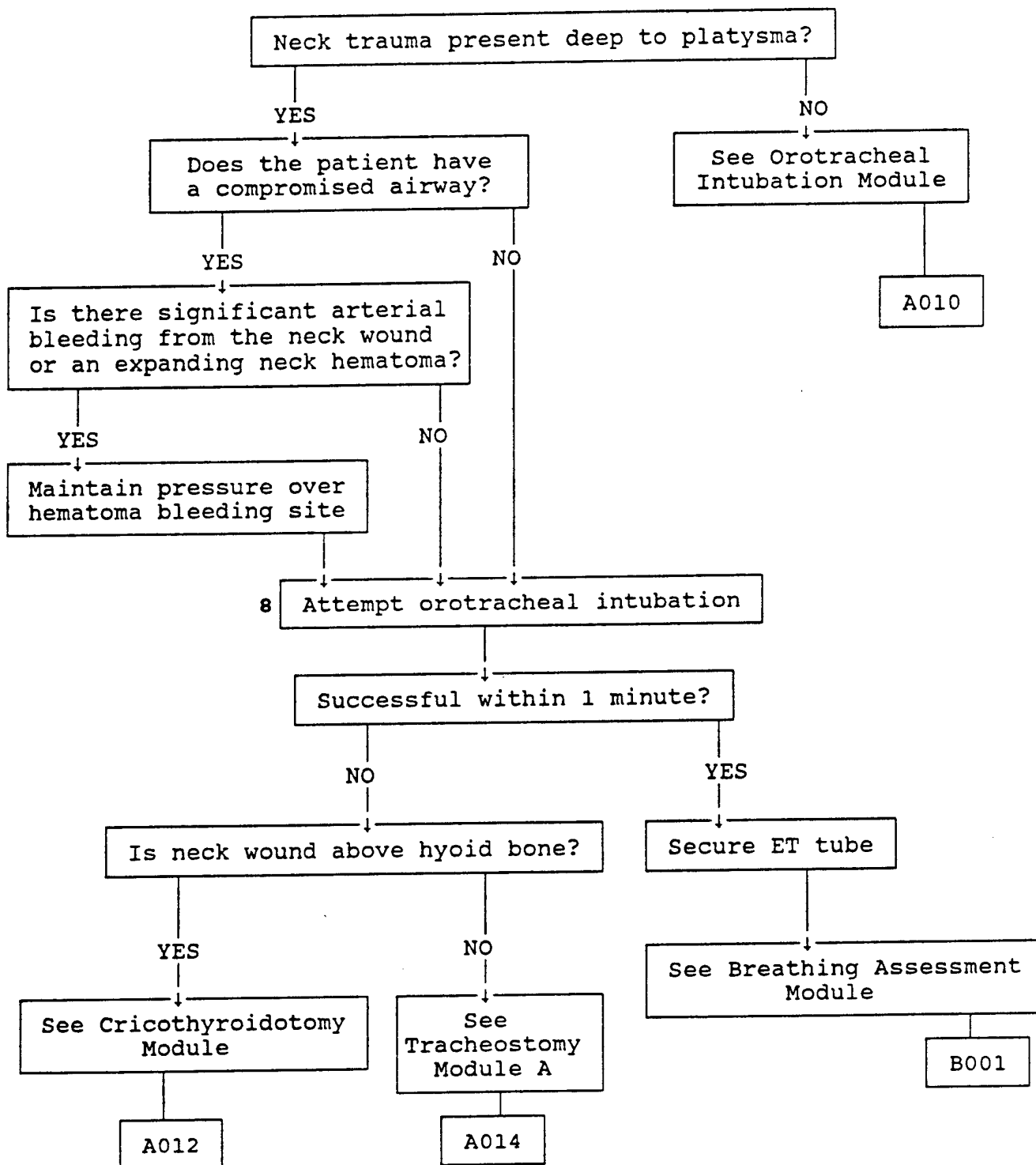


Module A



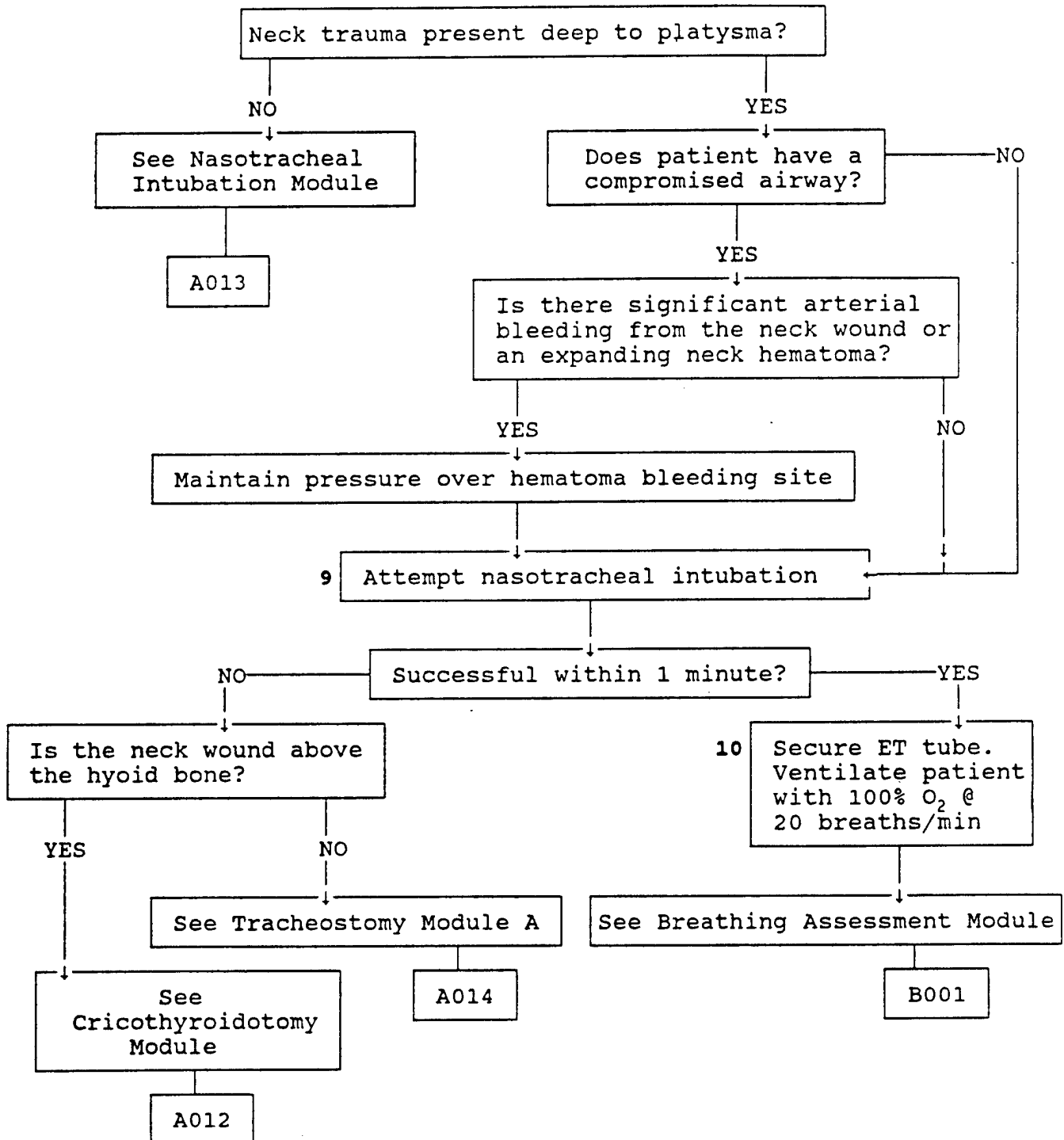
EMERGENCY INTUBATION MODULE

Module B

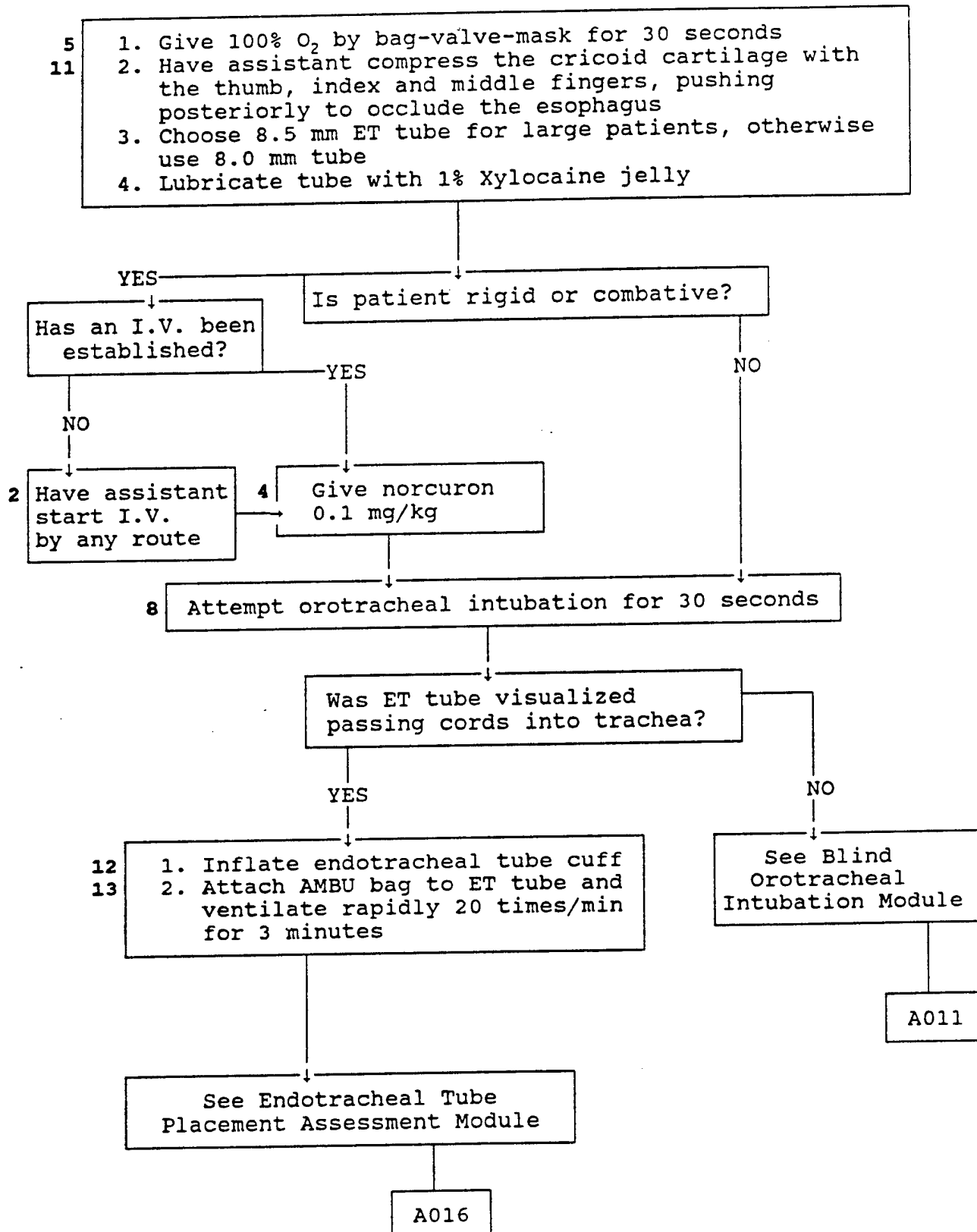


EMERGENCY INTUBATION MODULE

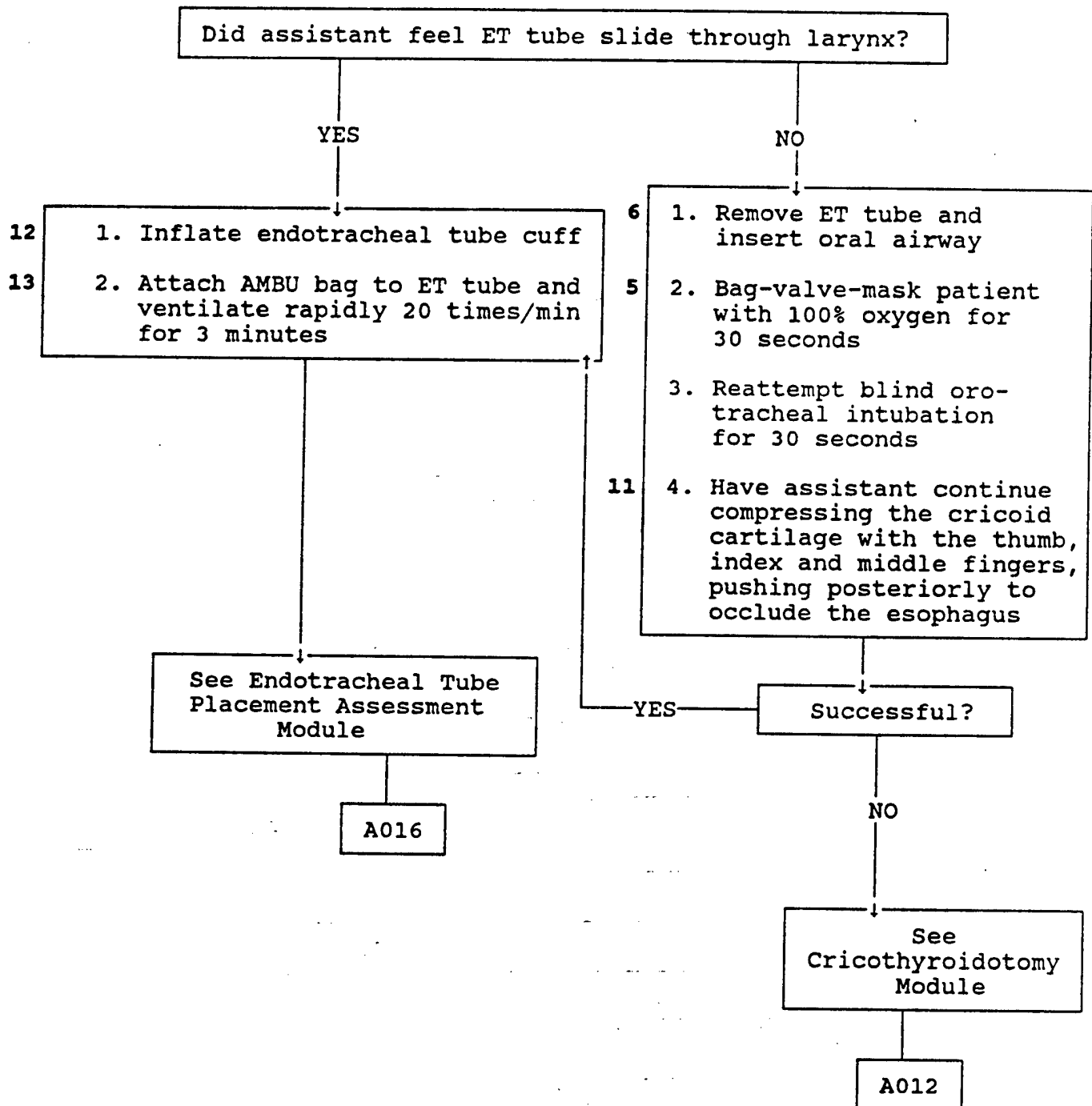
Module C



OROTRACHEAL INTUBATION MODULE



BLIND OROTRACHEAL INTUBATION MODULE





- 11 1. Assistant compresses the cricoid cartilage with the thumb, index and middle fingers of one hand, pushing posteriorly to occlude the esophagus. Assistant compresses thyroid cartilage with the other hand until procedure is completed
- 14 2. Operator makes a horizontal stab wound in cricothyroid membrane and twists scalpel to allow operator to insert a hemostat to enlarge the opening
- 15 3. Operator inserts through cricothyroidotomy opening an 8.0 mm ED tracheostomy tube for large patients (7.0 mm ED tracheostomy tube for all other adults)
- 13 4. Operator inflates tracheostomy tube cuff and ventilates patient with 100% O<sub>2</sub> and ambu bag-valve-tube technique at 20 breaths/min for 1 minute
- 19 5. Suction tracheostomy tube for 10 seconds
6. Resume positive pressure ventilation

Is tracheostomy cuff ruptured?

YES

Repeat steps 3, 4, 5, 6 with new tracheostomy tube

Does tracheostomy cuff rupture again?

YES

NO

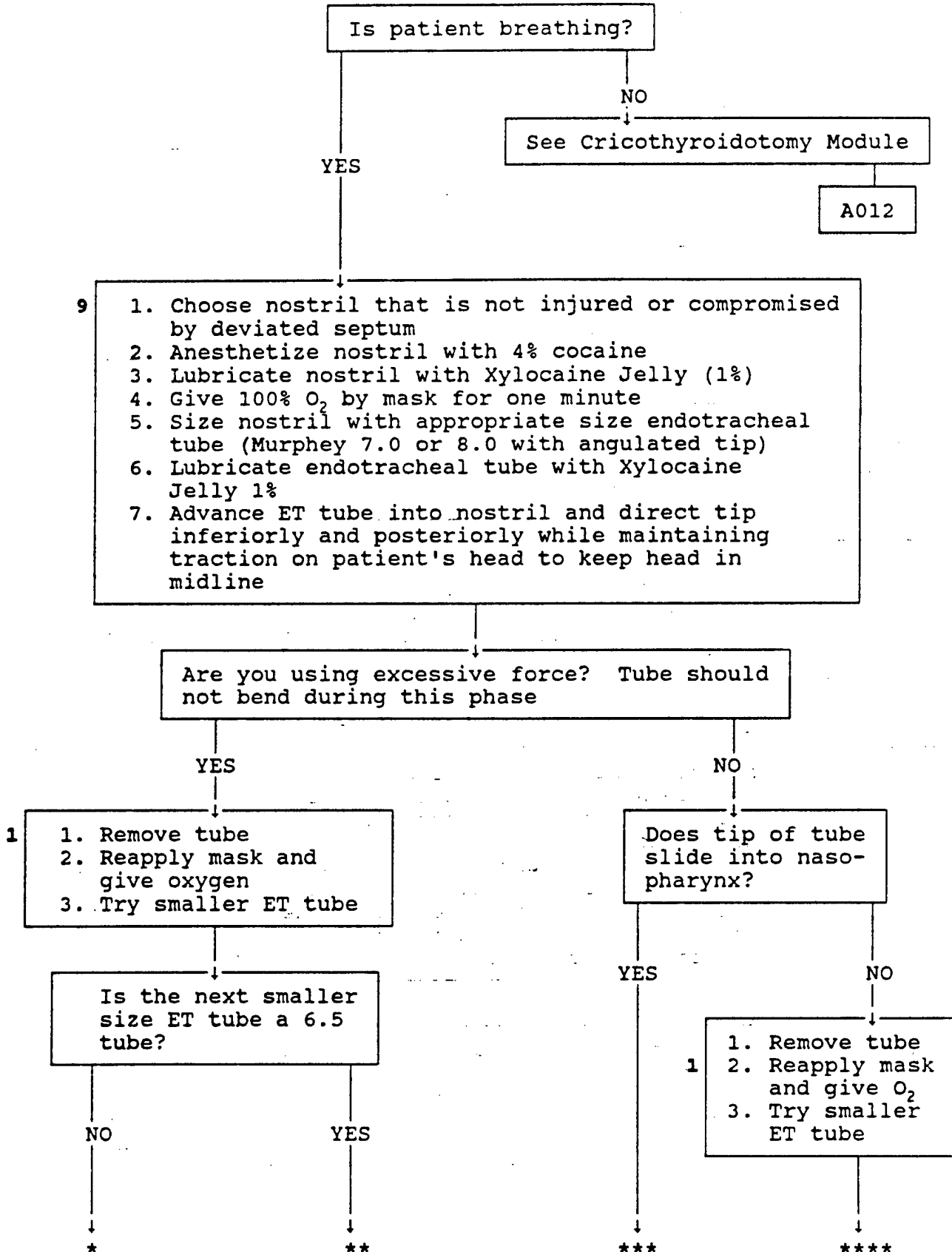
- 14 1. Enlarge opening of cricothyroidotomy
2. Insert into distal trachea red rubber catheter and slide tracheostomy tube over catheter
3. Remove catheter while suctioning
- 12 4. Inflate tracheostomy cuff
- 13 5. Ventilate patient with 100% oxygen using bag-valve-tube technique

NO

- 16 1. Secure tracheostomy tube with sutures (2-0 silk) and surgical tape around neck
- 17 2. If bleeding, suture anterior jugular veins with 4.0 vicryl above and below surgical incision while assistant maintains pressure

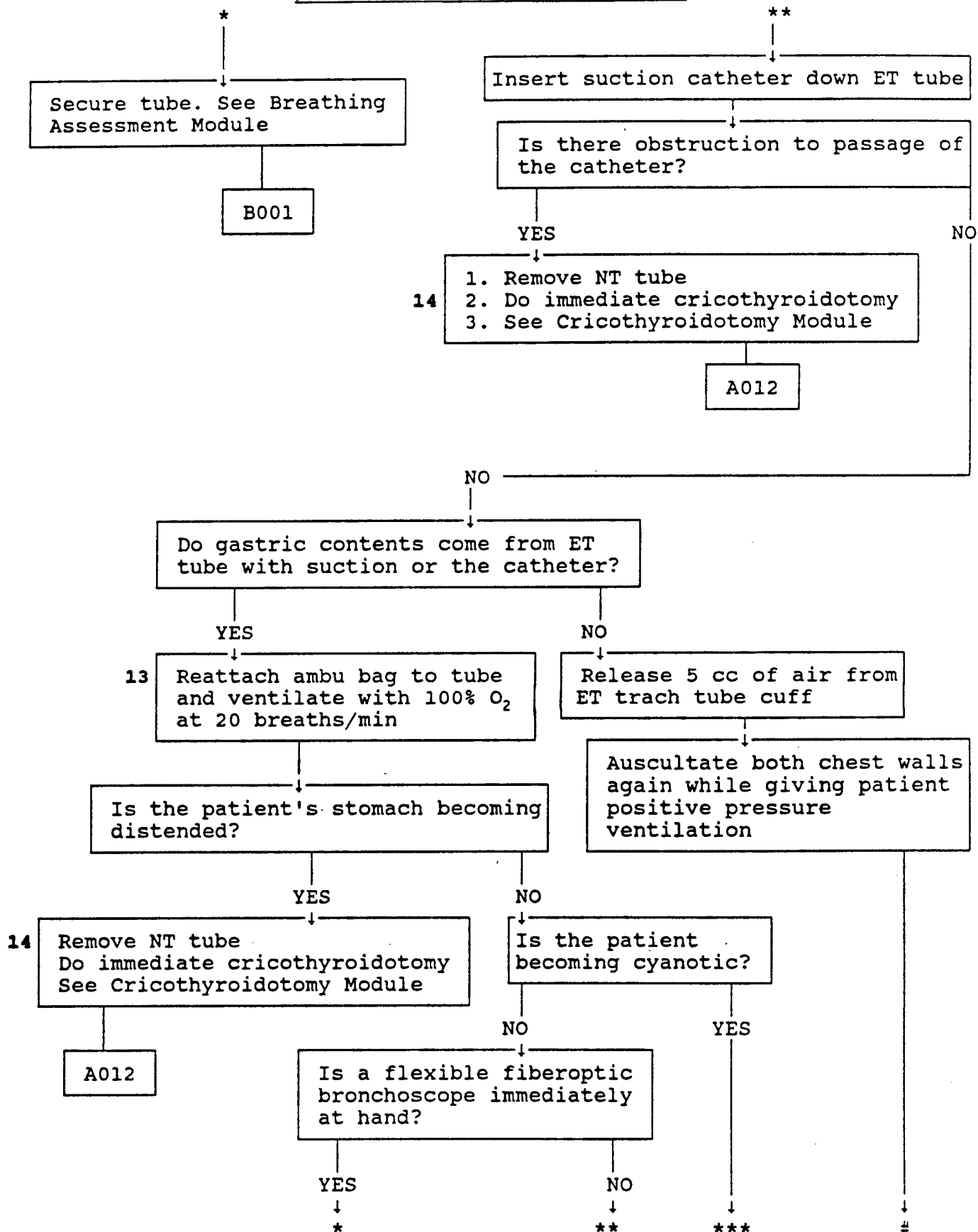
See Breathing Assessment Module

B001

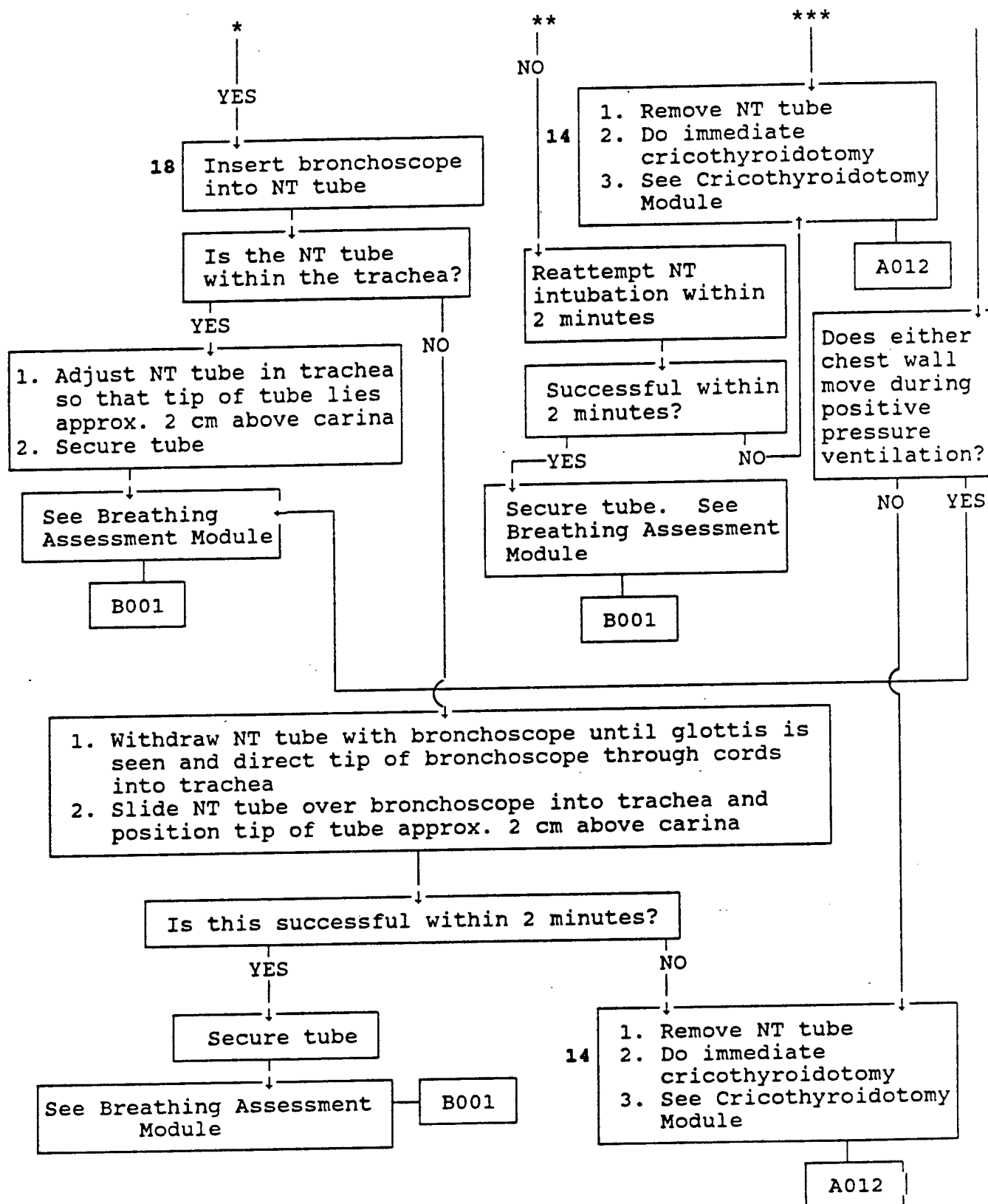


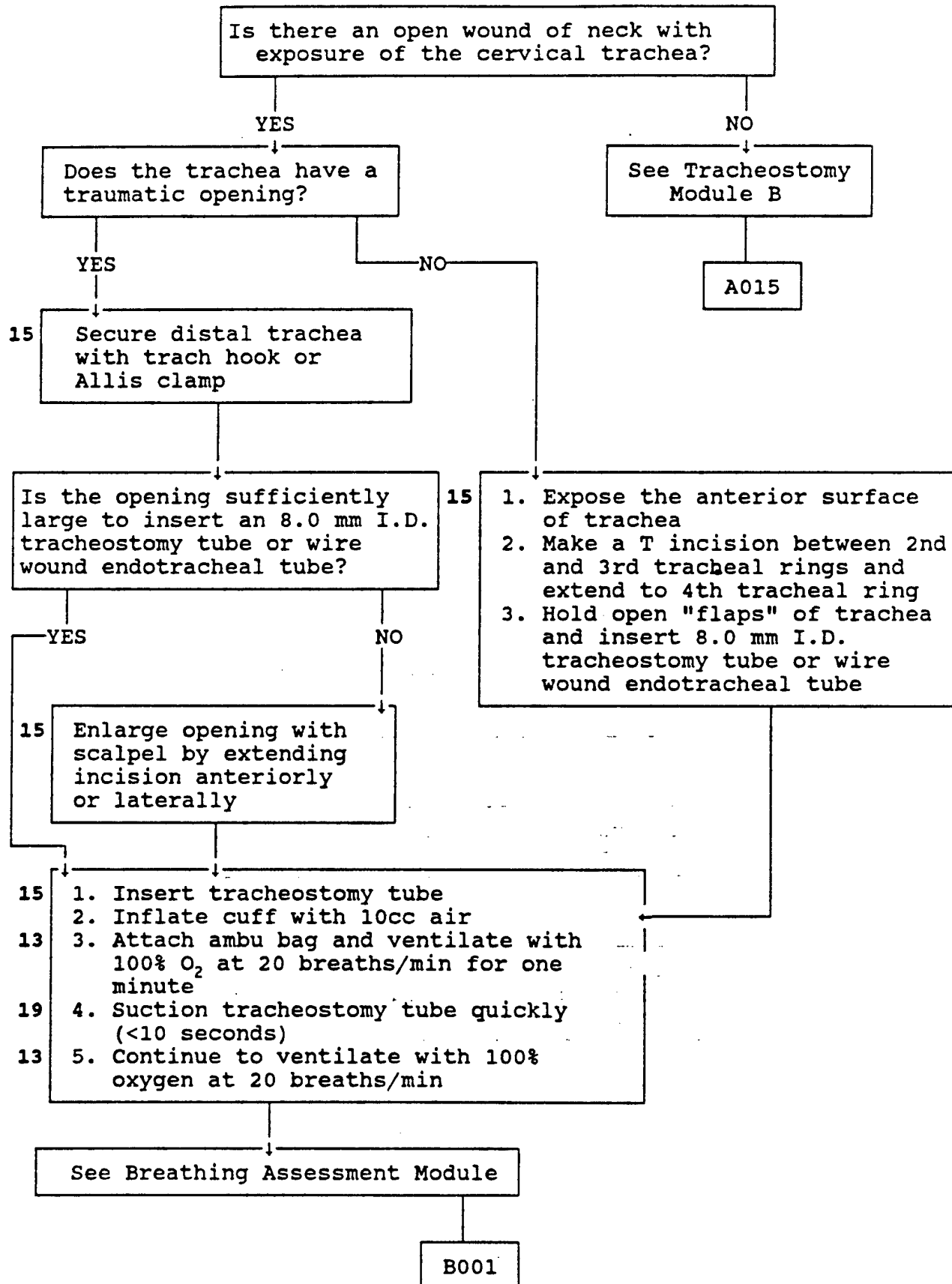


NASOTRACHEAL INTUBATION MODULE



# NASOTRACHEAL INTUBATION MODULE





TRACHEOSTOMY MODULE B

15

1. Make a vertical incision over trachea from cricoid cartilage to suprasternal notch
2. Have assistant compress both skin edges forcibly while pulling skin and underlying tissue laterally
3. Stab with scalpel directly posteriorly until trachea is entered below cricoid cartilage and continue inferiorly for 2 cm
4. With clamp in superior part of tracheal incision spread trach incision open and insert 8.0 mm I.D. trach tube or wire wound endotracheal tube
5. Inflate cuff with 10 cc air
6. Attach ambu bag and ventilate with 100% O<sub>2</sub> for 20 breaths
7. Suction quickly tracheostomy tube for less than 10 seconds
8. Resume ventilation with 100% oxygen at 20 breaths/min

Control bleeding thyroid isthmus  
with running sutures

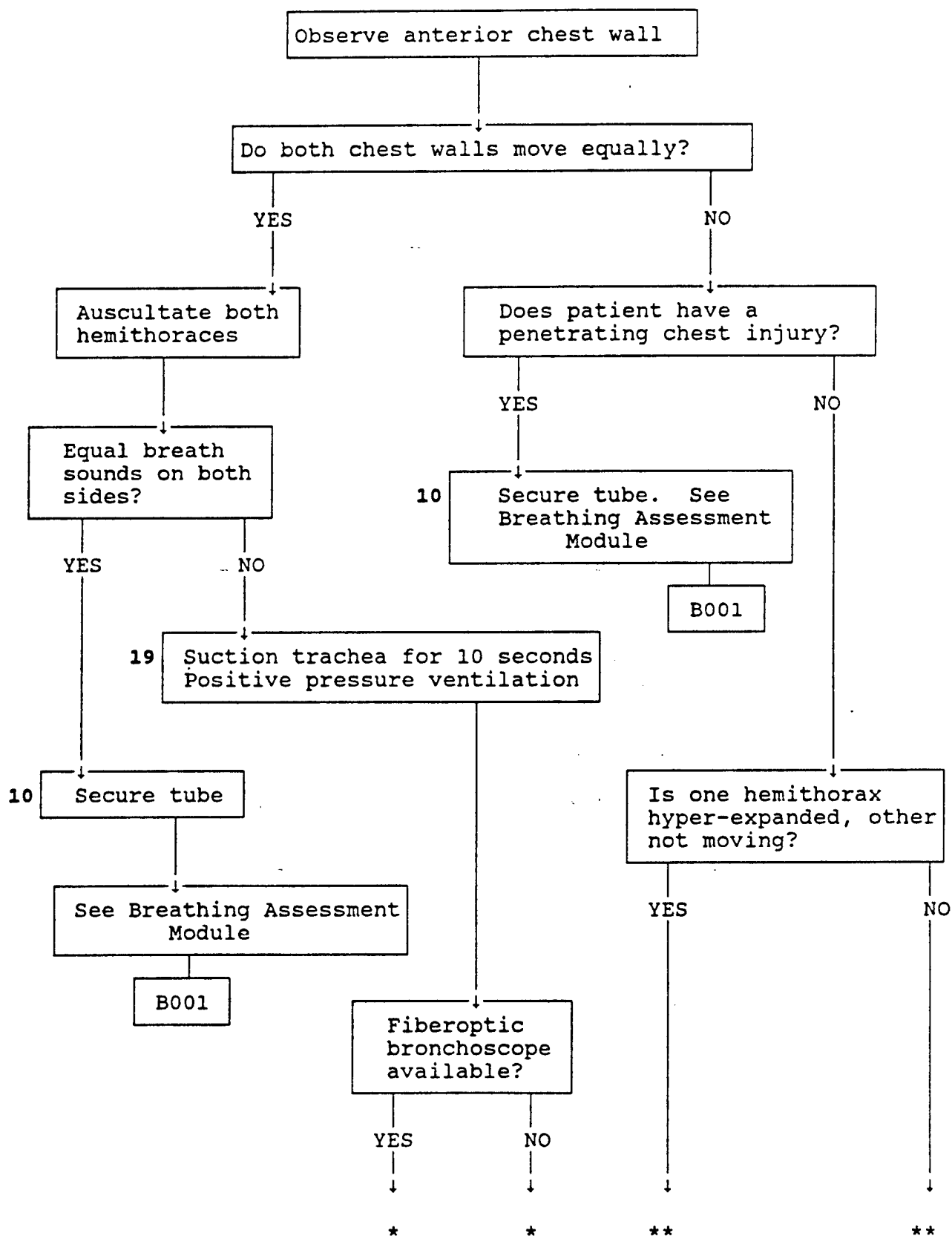
16

Secure tracheostomy tube or wire  
wound endotracheal tube with  
2-0 or 0 silk sutures

See Breathing Assessment Module

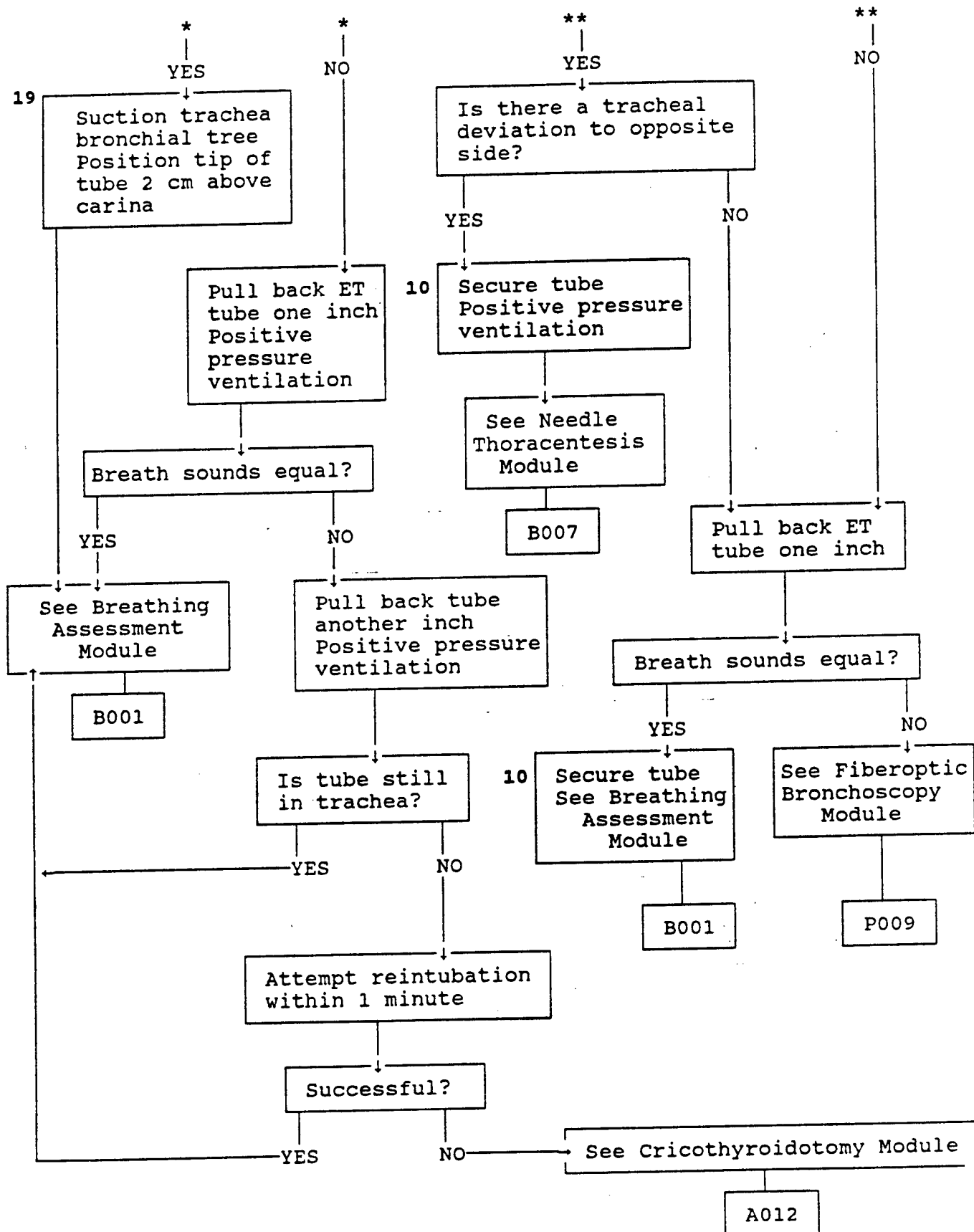
B001

ENDOTRACHEAL TUBE PLACEMENT ASSESSMENT MODULE





# ENDOTRACHEAL TUBE PLACEMENT ASSESSMENT MODULE



5  
BREATHING

Please do not shoot the pianist. He is doing his best.  
[Adjunction to the patrons in a saloon in  
Leaderville, Colorado: Oscar Wilde]

A. Overview

After securing the airway, the focus changes to evaluating the patient's ability. Breathing depends on two components: the active expansion and relaxation of the chest wall and diaphragm, and the passive response of the pulmonary tissue and supportive airway to the changes in the intrapleural pressure.

Here, the algorithms begin with the assumption that an appropriate airway has been established. Obviously, there is significant overlap in the airway and breathing modules. The thrust is to rapidly evaluate the patient for significant chest wall injury (flail segment, open thoracic wounds) or more subtle injury that can lead to rapid deterioration (tension pneumothorax, tracheobronchial injury). Once the patient's breathing is secured, then the circulatory system can be addressed.

B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.

Striking him in the L groin region . . .

4. Presentation to the hospital ship/field hospital. He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest.  
Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).

CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.

9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]

### C. Decision Trees

# BREATHING - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Provide O <sub>2</sub> by bag-valve-tube for intubated patients			3	2	1	O <sub>2</sub> source; O <sub>2</sub> tubing; Ambu bag; Stethoscope; Ventilator
2. Orotracheal Intubation	3	3	3	1*	1*	Endotracheal tube; tape; viscous lidocaine drugs for sedation
3. Provide O <sub>2</sub> by mask			3	2	2	O <sub>2</sub> source; O <sub>2</sub> mask
4. Cover defects with petrolatum gauze	3	3	2	2		Petrolatum gauze; 4 x 4's/tape
5. Apply local measures i.e. compression with sterile gauze, hemo-clips or ligation of arterial or major venous bleeders of minor chest wall wound(s)	3	3	1*	1*	1*	Sterile gauze; hemoclips; tape; 4 x 4's
5a. Continue efforts at clinician's discretion	3	3				
6. Needle Thoracentesis	3	3	1*	1*	1*	#10, 12, 14 angiocatheter; 1 1/2 finger glove/rubber band tape; Heimlich valve; (flutter valve/stop cock); Betadine; 16 gauge needle
7. Tube Thoracostomy (ies)	3	3				Chest tube (sizes #28, #32, #36) catheters; scalpel; Betadine prep; large curved clamp; chest drainage collector device; xylocaine/syringe; 4 x 4'; suture; needle holder
8. Insert chest tube	3	3				Betadine prep; Stearns saw; Lebshe knife; Cautery 4/0 monofilament pledgeted sutures; cardiac tape; 4/0 prolene; scalpels; clamps; hemoclips; chest retractors; suctions; chest tube (male #36; female #32; child #28); curved clamp; needle holder; prep solution; xylocaine/syringe; 4 x 4's; tape
9. Secure tube with sutures and attach to chest drainage system	3	3				Suture; needle holder; gauze; gauze; Benzoin; tape; sterile H <sub>2</sub> O; suction
10. Autotransfusion	3	3	2	2	1*	Autotransfusion set for chest drainage device; citrate or heparin
11. Clamp chest tube	3	3	2	2	1	Chest tube drainage set; clamps

## \*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

In all cases, the specialty surgeon is a thoracic surgeon.

In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.

Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

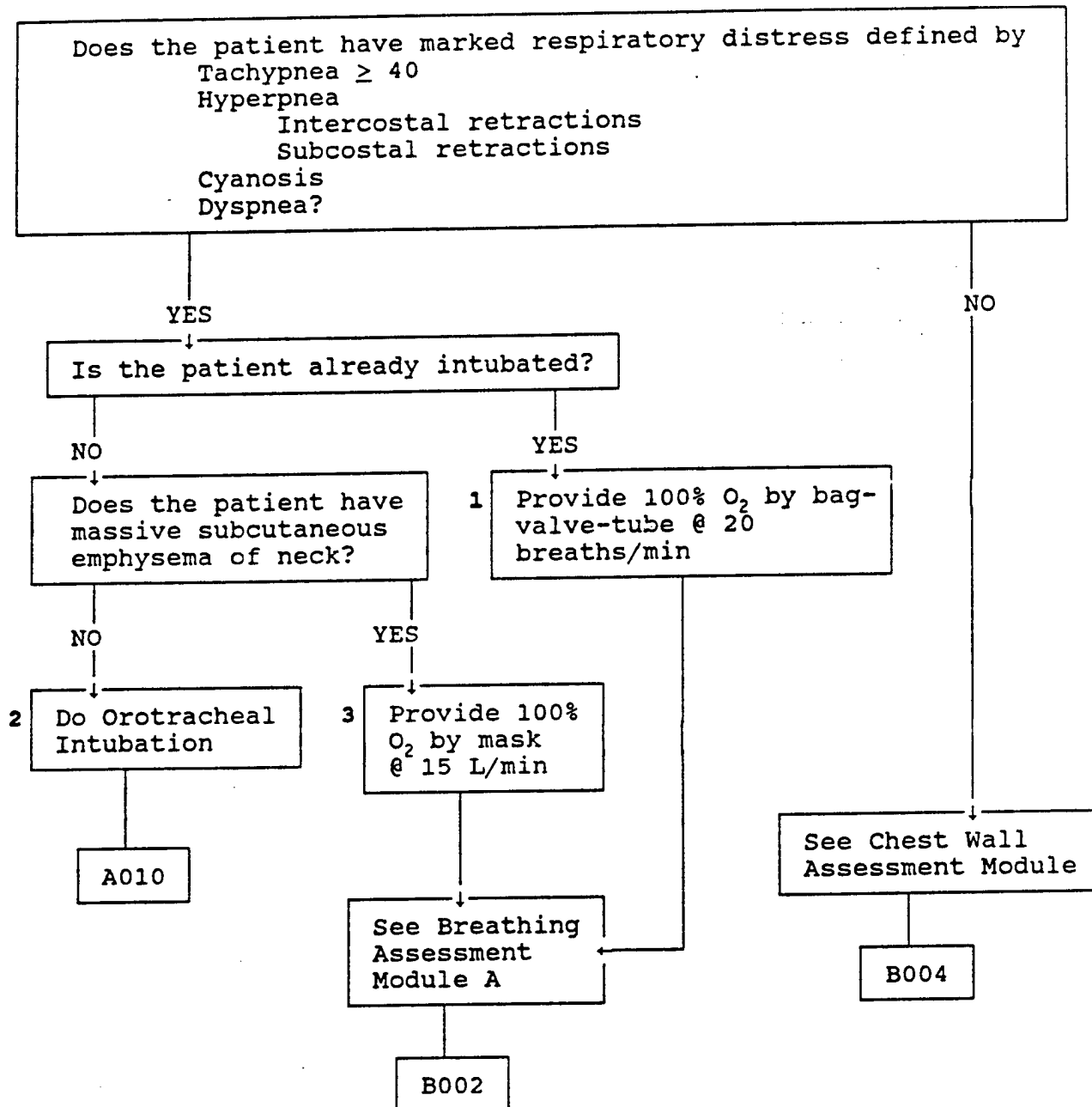
12. Chest tube declotting	3	3	1*	1*	1*	Fogarty balloon catheter; Foley balloon catheter; Nasotracheal suction catheter; sterile connections
13. Tighten or reposition chest tube	3	3	1	1	1	No equipment needed

TRAUMA CHEST TRAY - Minimal equipment

---

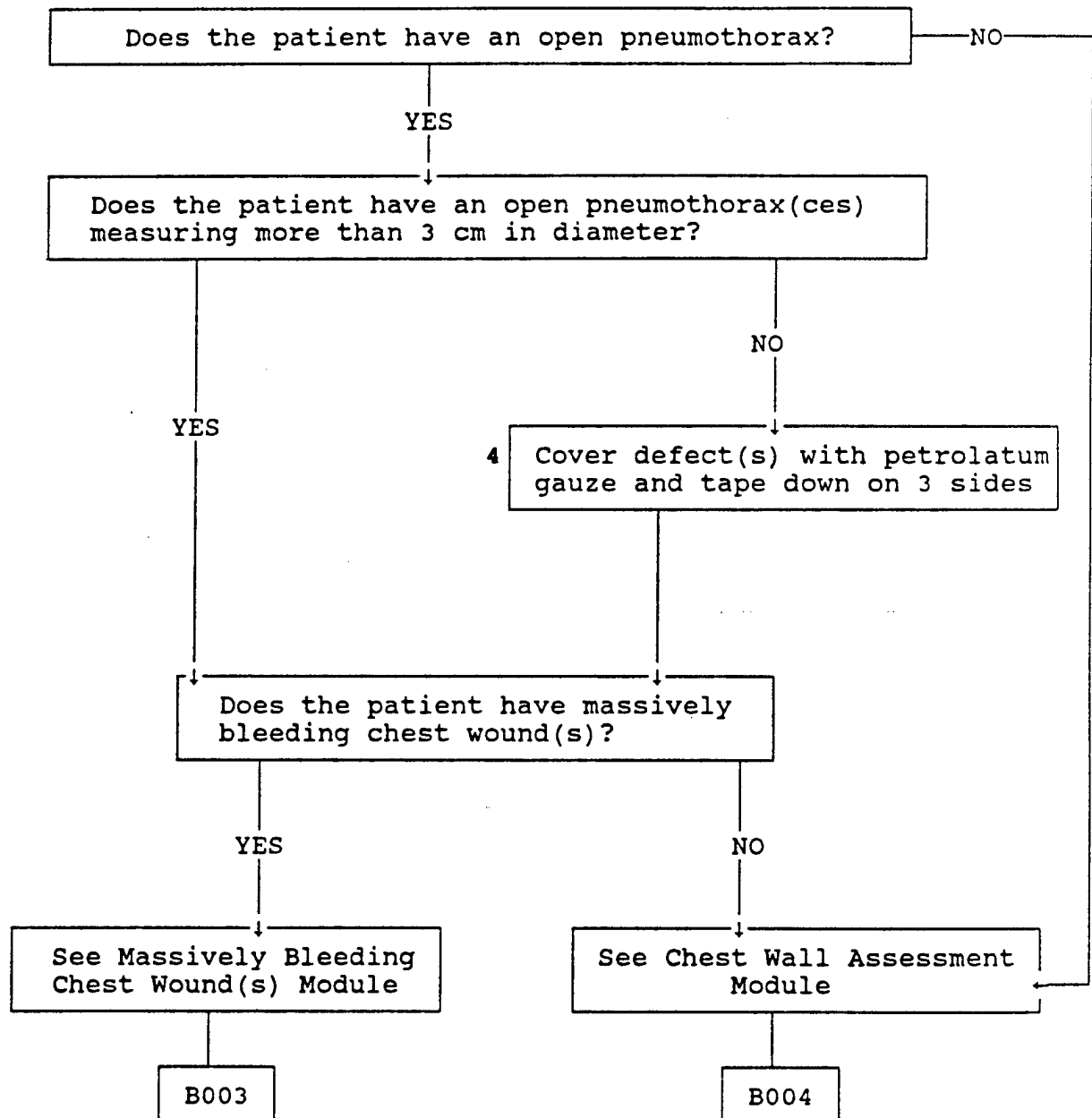
- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
- STERNAL SAW/LEBSCHKE
- BETADINE PREP
- SUTURE FOR REPAIR
- SUCTION
- CHEST TUBES
- DRAINAGE SYSTEM

BREATHING ASSESSMENT MODULE

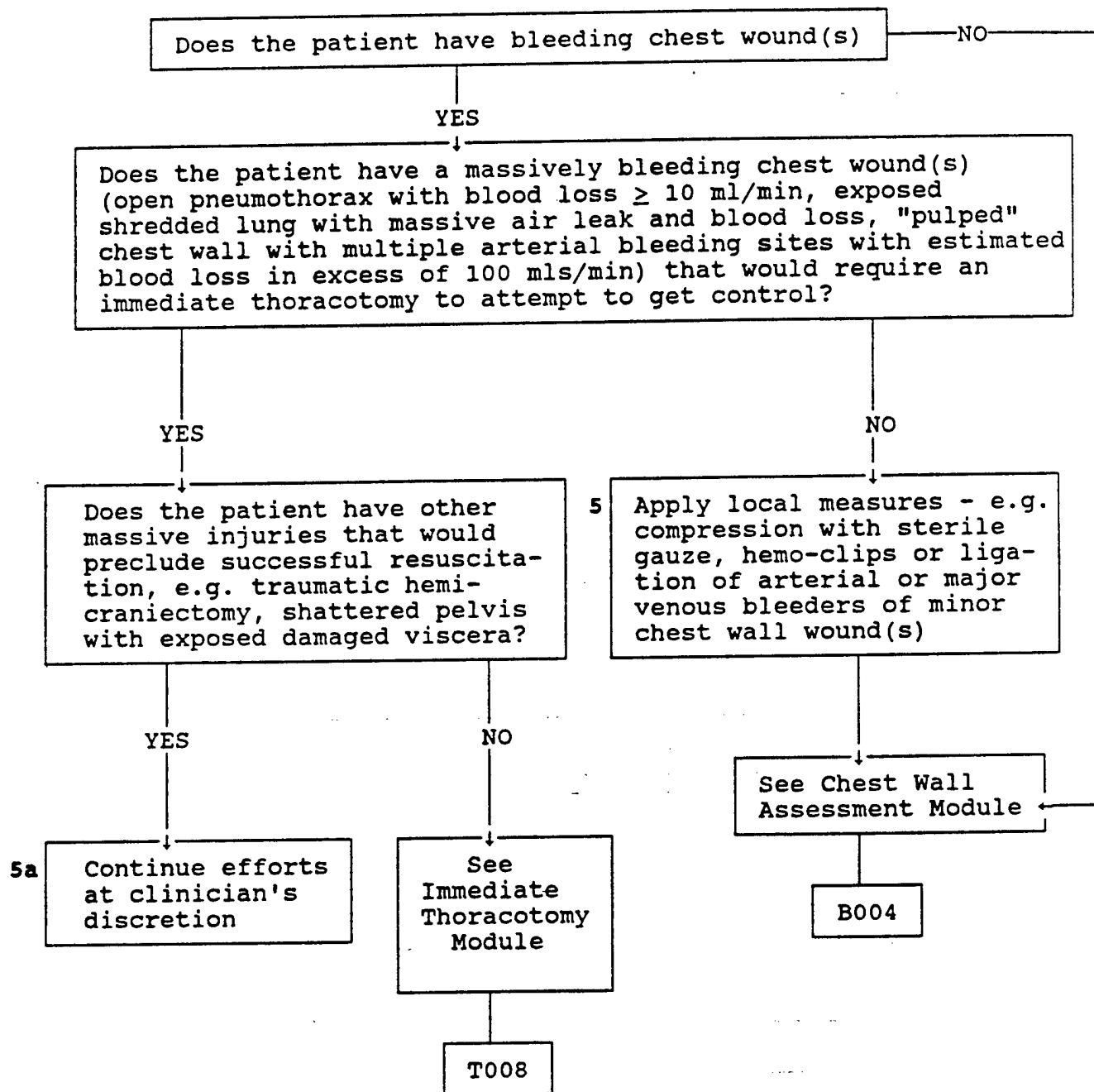




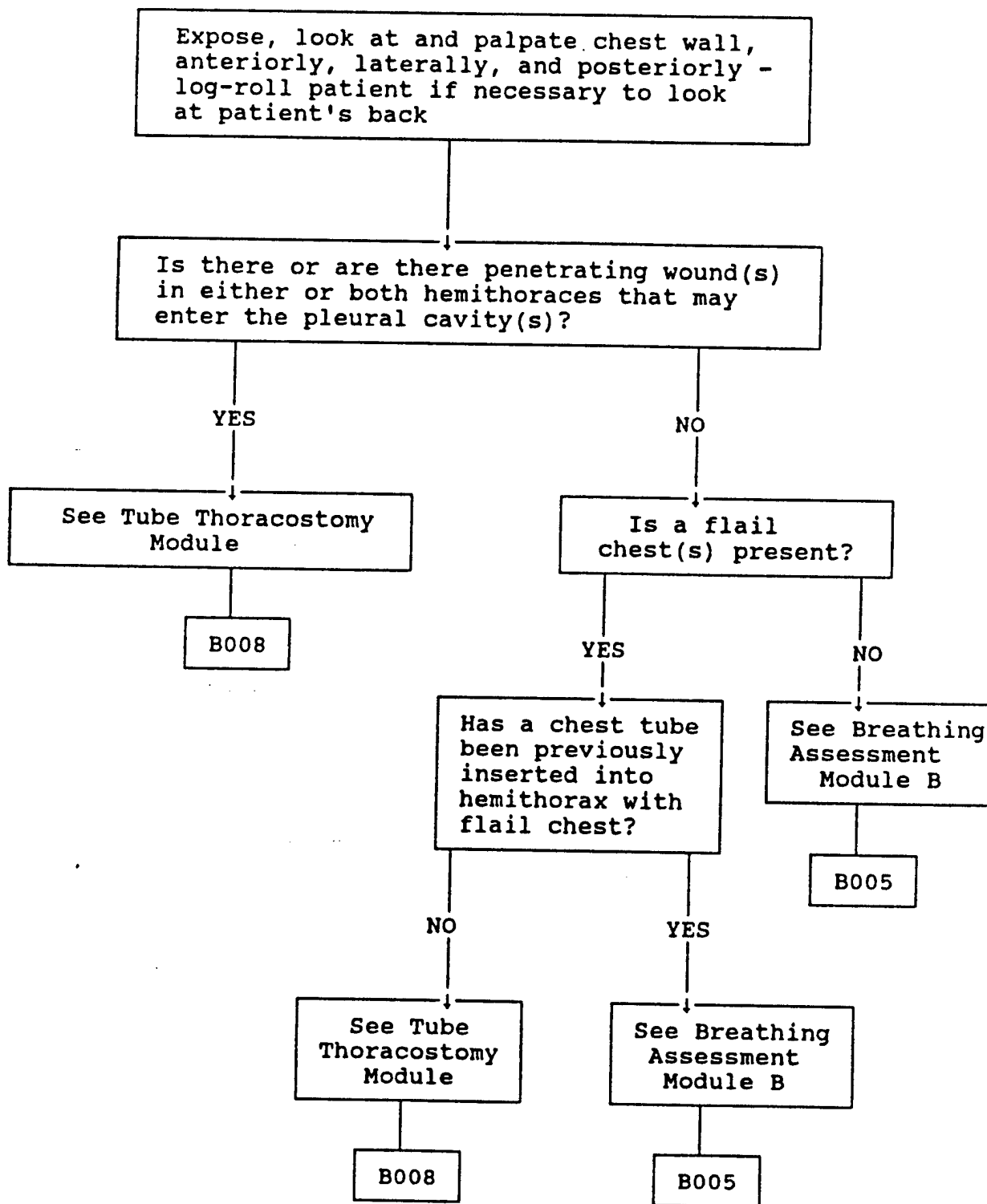
BREATHING ASSESSMENT MODULE A



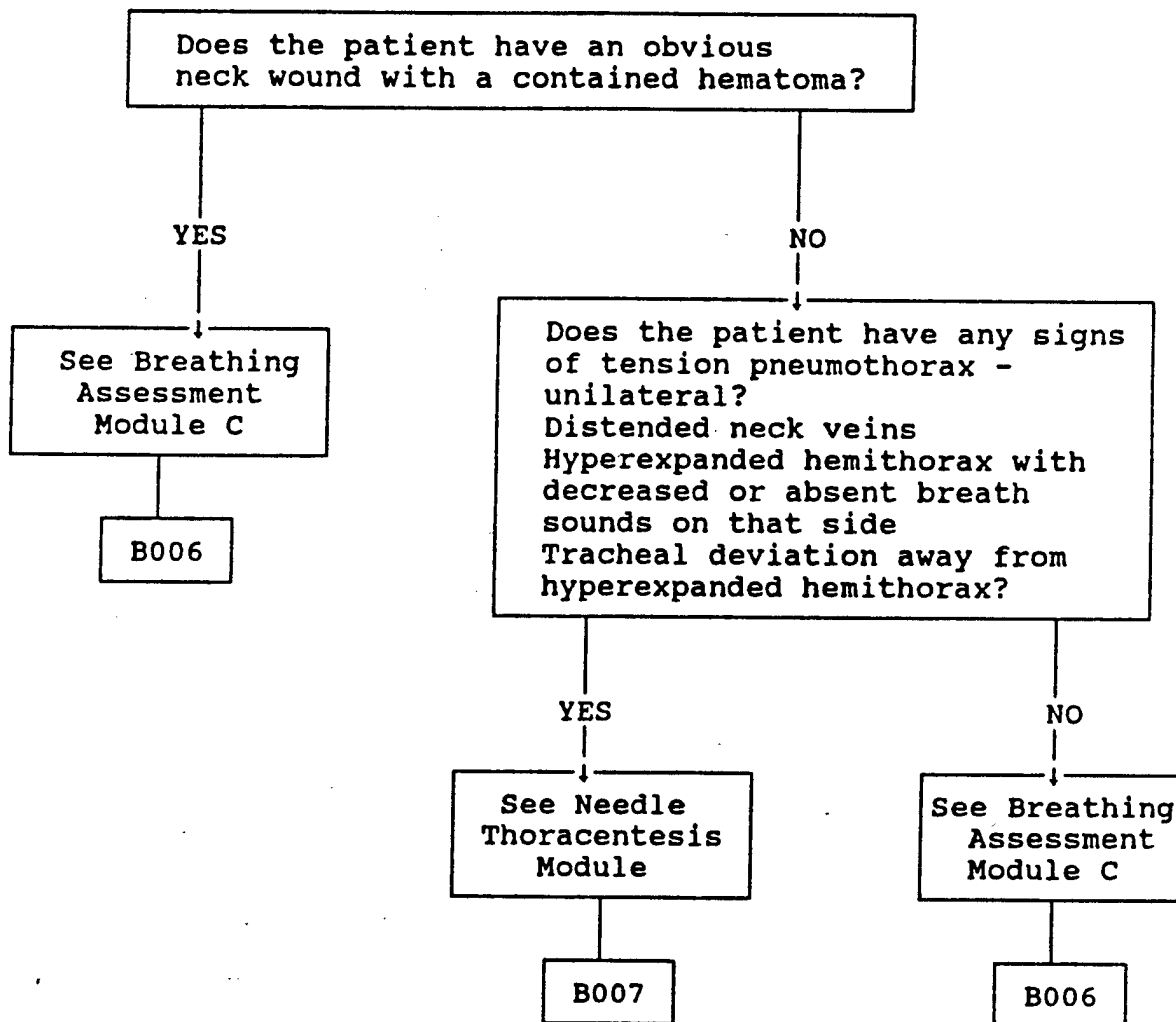
MASSIVELY BLEEDING CHEST WOUND(S) MODULE



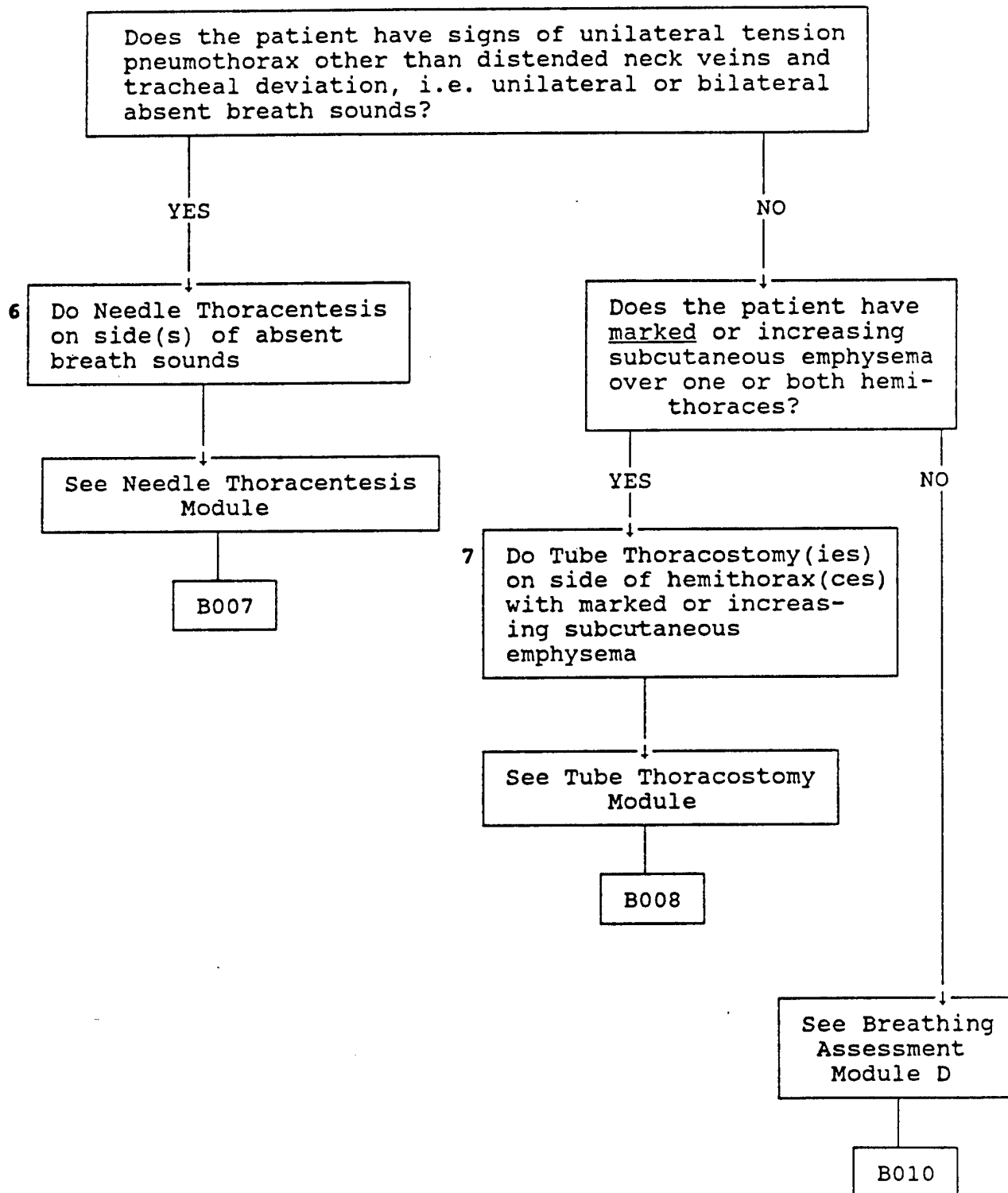
CHEST WALL ASSESSMENT MODULE



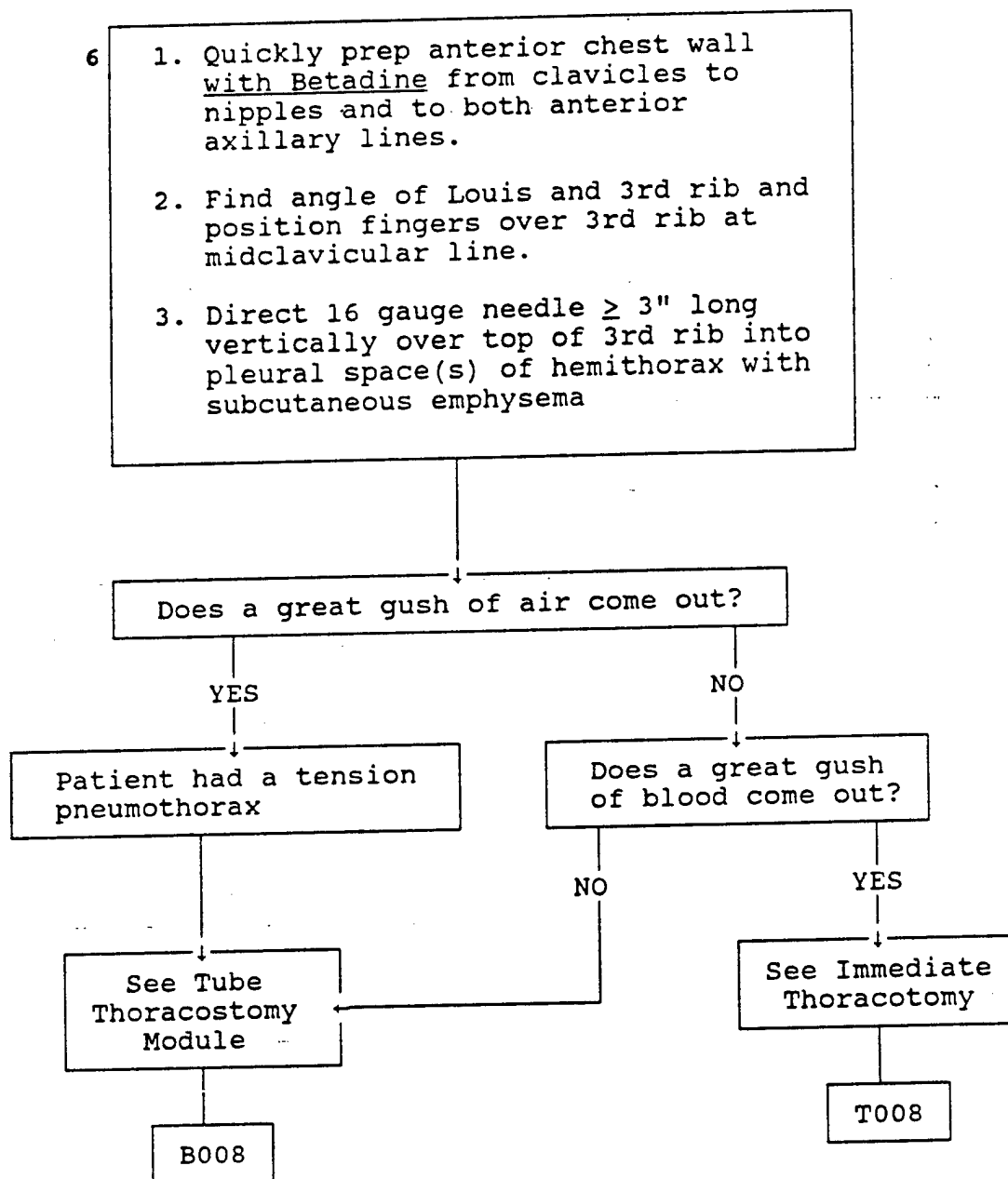
BREATHING ASSESSMENT MODULE B



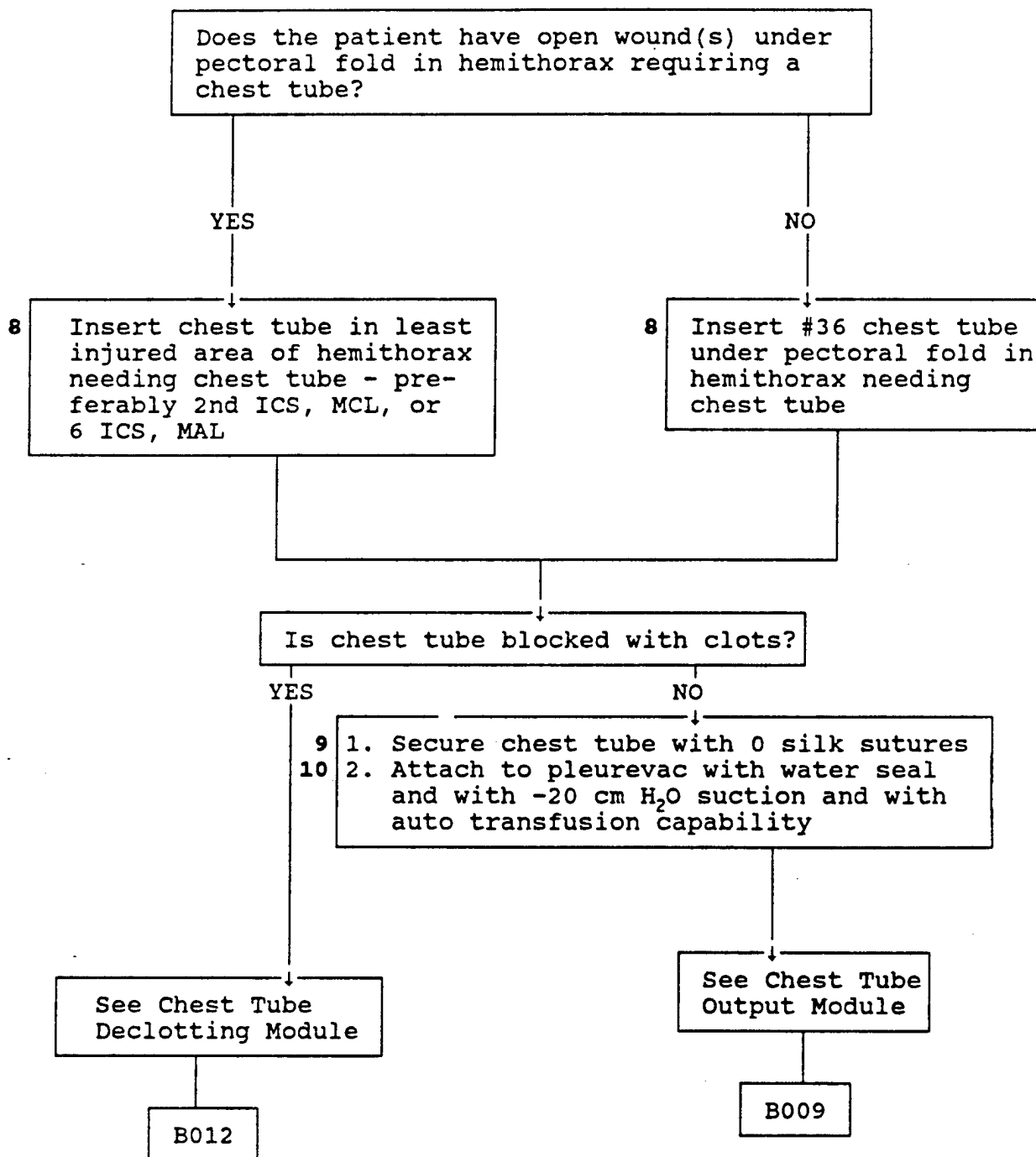
BREATHING ASSESSMENT MODULE C



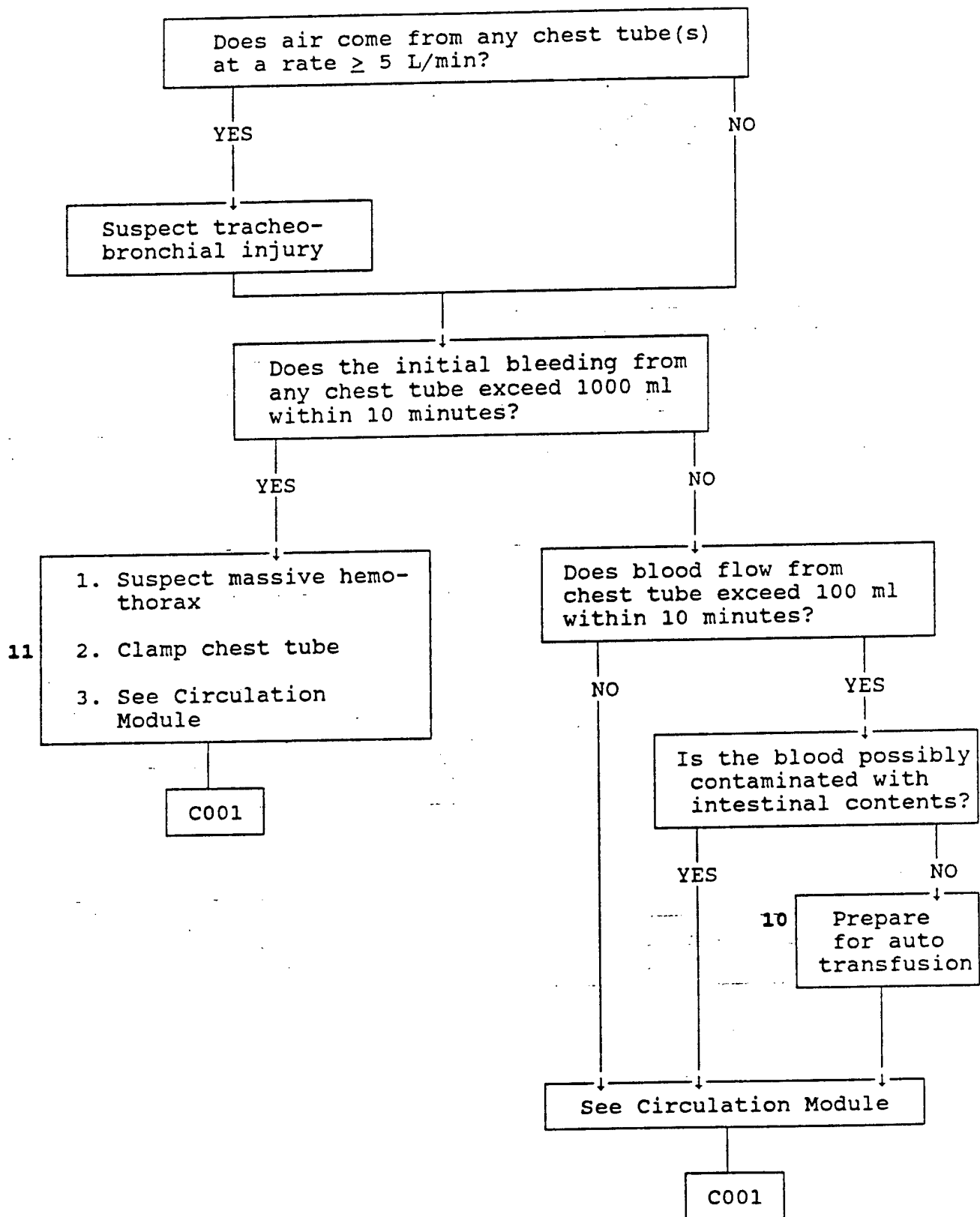
NEEDLE THORACENTESIS MODULE



TUBE THORACOSTOMY MODULE

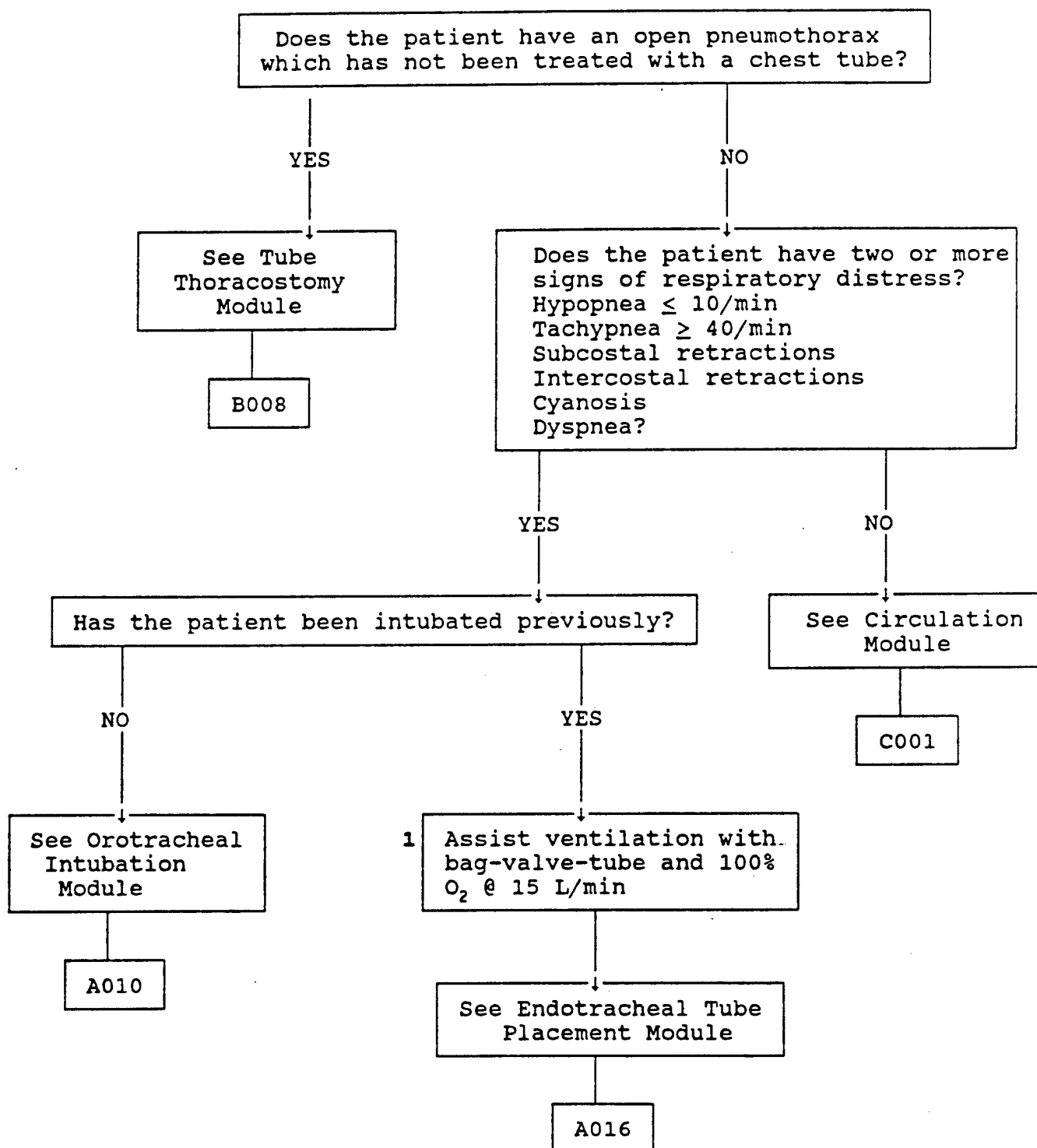


CHEST TUBE OUTPUT MODULE

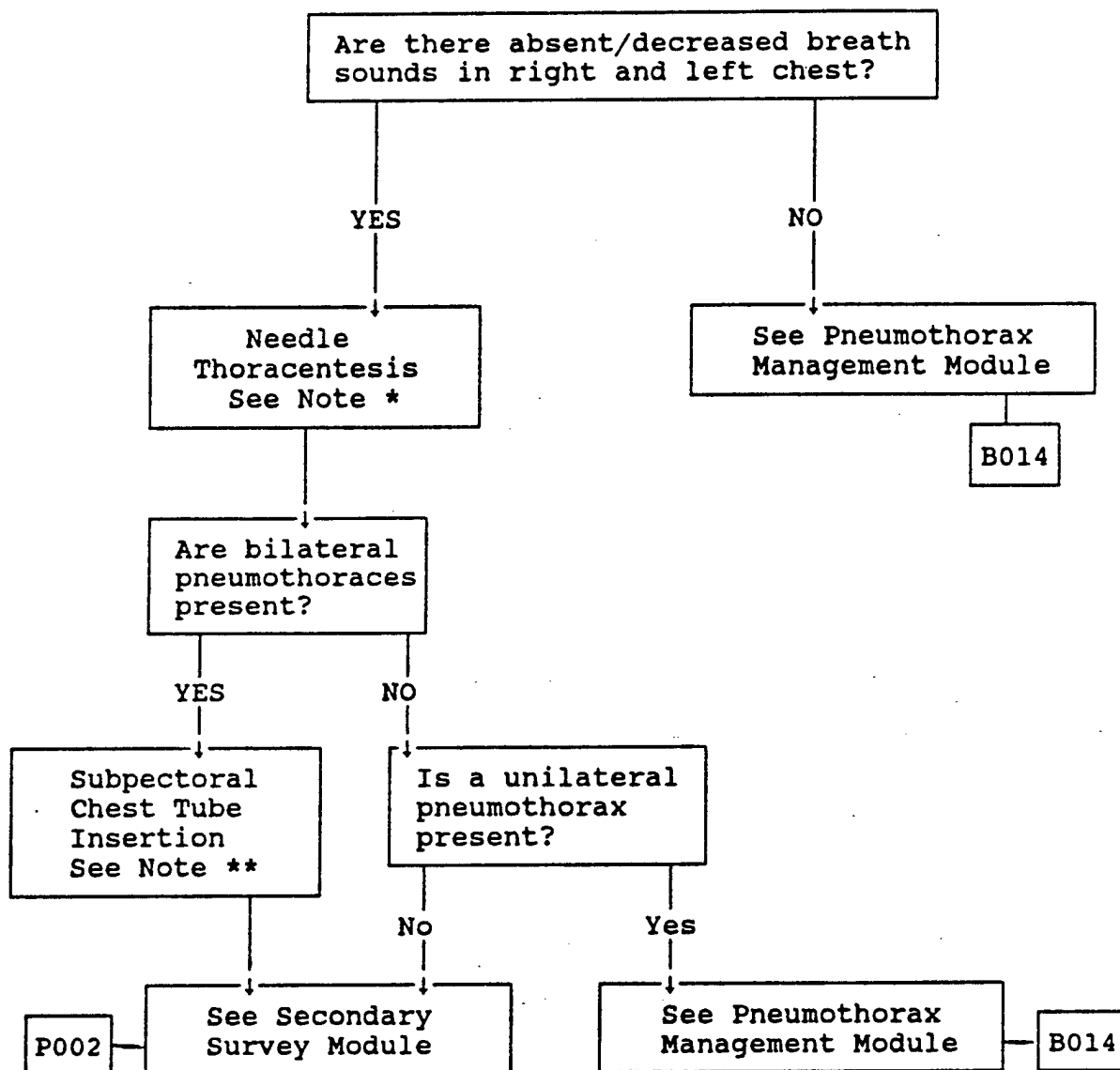




BREATHING ASSESSMENT MODULE D



BILATERAL TENSION  
PNEUMOTHORAX MODULE

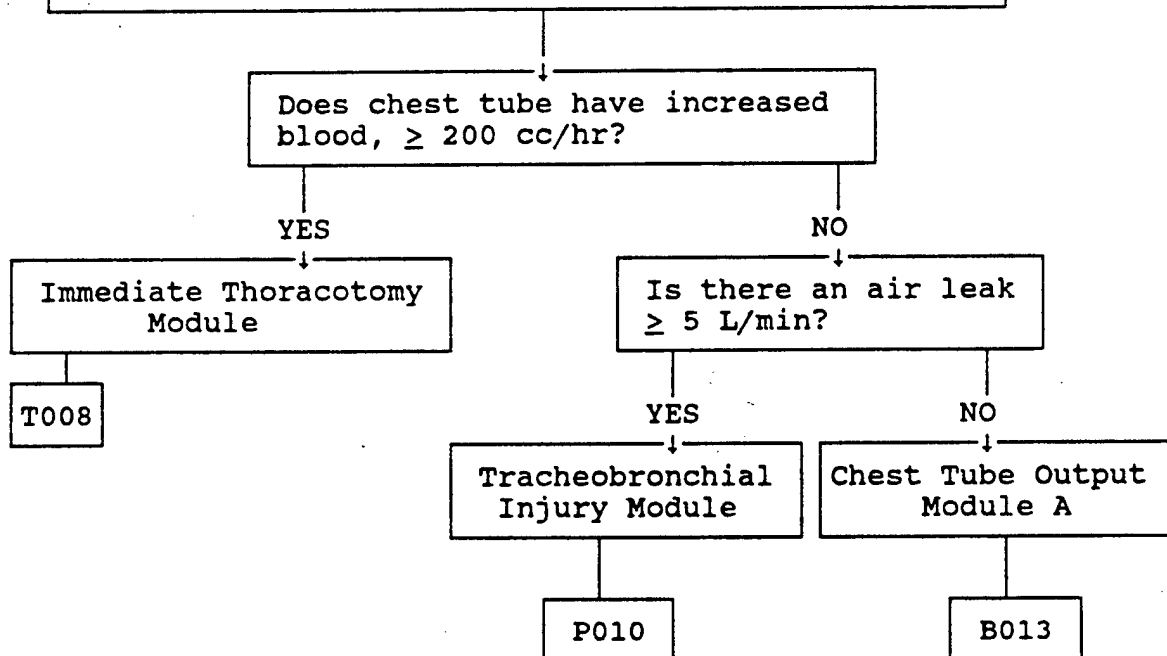


Note \* : See Module B007 for technique  
Note \*\* : See Module P014 for technique

CHEST TUBE DECLOTTING MODULE

12

- 1.) Sterile prep of chest tube - pleurevac connection.
- 2.) Separate connection.
- 3.) Pass one or more of following to evacuate clots:
  - a) Fogarty balloon catheter;
  - b) Foley balloon catheter;
  - c) Nasotracheal suction catheter.
- 4.) Repeat as needed until chest tube clear.  
Resume suction via pleurevac.

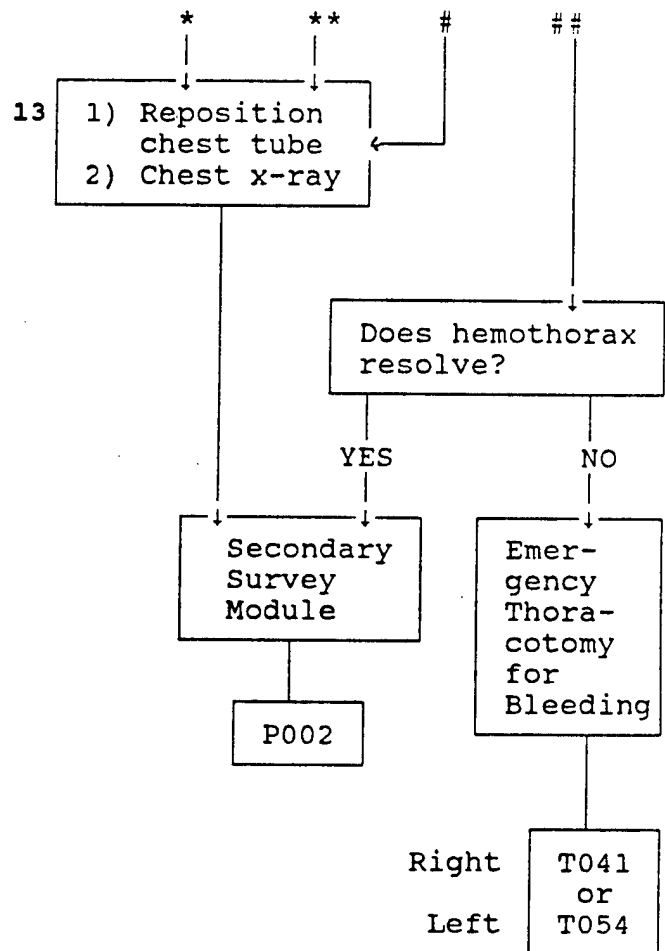




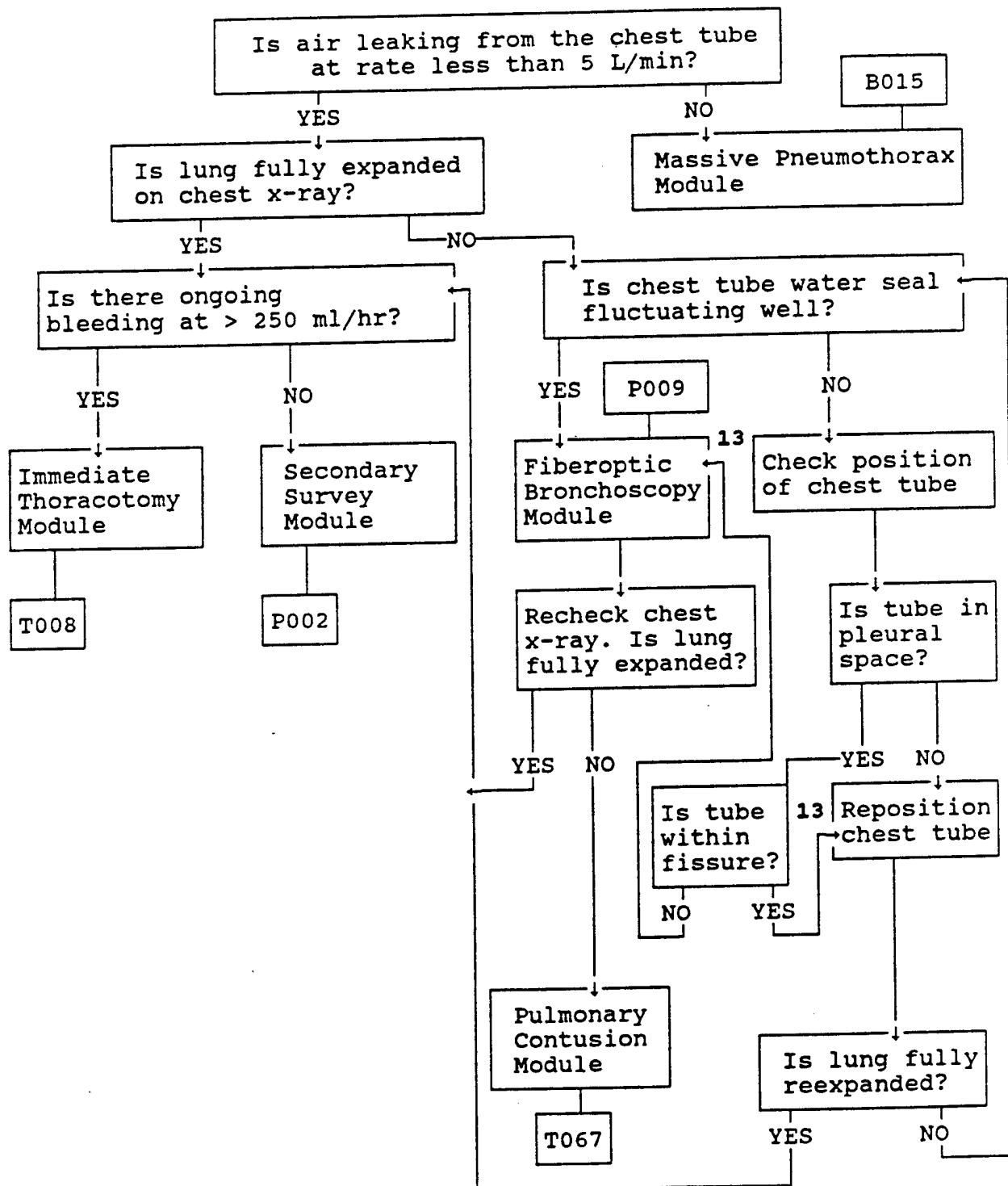
CHEST TUBE OUTPUT MODULE A

B013

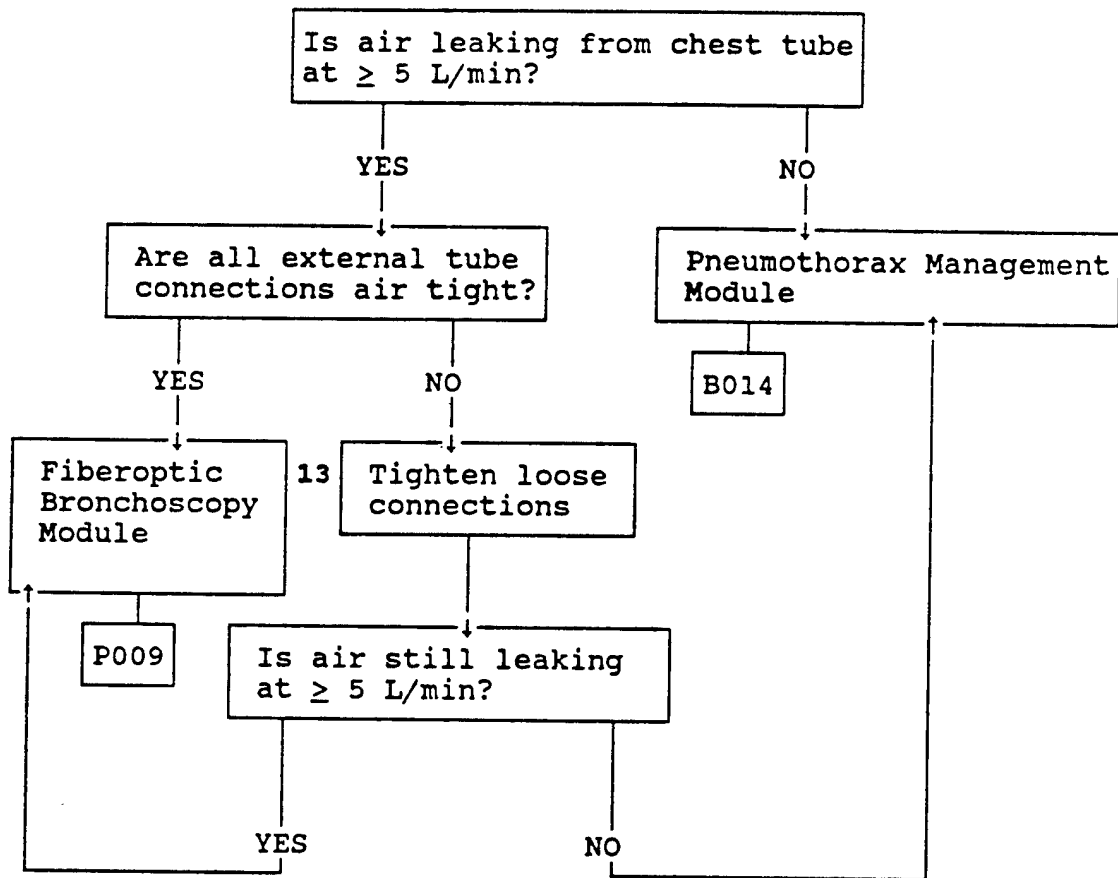
2/2



PNEUMOTHORAX MANAGEMENT  
MODULE



MASSIVE PNEUMOTHORAX  
MODULE



6  
CIRCULATION

Thou shalt not covet thy neighbor's house,  
thou shalt not covet thy neighbor's wife,  
nor his manservant, nor his maidservant,  
nor his ox, nor his ass,  
nor anything that is thy neighbor's.  
[Exodus 20:17]

A. Overview

Disruption of the circulatory system often poses the most dramatic and compelling problems. The physician must stem significant hemorrhage while making sure that the Airway and Breathing modules are satisfactorily addressed. In the initial survey, the team must simultaneously control obvious sources of massive blood loss and provide intravenous access.

The algorithms emphasize adequate intravenous access. Blood loss has to be matched with replacement fluid. Approaches to the venous return system are through large bore peripheral and central venous catheters. Once venous access is satisfactory, the source of rapidly life-threatening hemorrhage can be identified and dealt with appropriately. Hemorrhage that is quickly fatal implies injury to the heart, great vessels in the chest and abdomen, major arterial injuries, pelvic fractures, hepatic, or splenic disruption. Rapid control of these structures in concert with establishing multiple intravenous access sites is the basis for circulation modules.

B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .



2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:  
CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat

surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you.

]

### C. Decision Trees

## CIRCULATION - PROVIDER &amp; EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
 B - Specialty Surgeon  
 C - Anesthesiologist  
 D - Nurse  
 E - Corpsman

Key to care descriptors: 1 - Minimal  
 2 - Adequate  
 3 - Optimal  
 \* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Infuse lactated Ringer's solution			3	2	1	Ringer's lactate; established I.V. line/tubing
2. Insert percutaneously #14 gauge or #16 gauge 2" catheters into arm veins	3	3	1*	1*	1*	Venous catheters (#14 gauge or #16 gauge 2"); #12 sterile feeding tube; 2-0 silk ligatures; 2" silk suture with Keith needle; scalpel; (see trauma tray)
2a. Insert by cutdown #14 gauge or #16 gauge 2" catheters into arm vein	3	3	1*	1*	1*	Venous catheter; 14 gauge 2" cutdown catheter; 16 gauge 2" cutdown catheter; #12 sterile feeding tube; 2-0 silk ligatures; 2-0 silk suture with Keith needle; scalpel; Betadine; (see trauma tray)
3. Cutdown on greater saphenous vein at groin	3	3	1*	1*	1*	Venous catheter; 14 gauge 8" cutdown catheter; 16 gauge 8" cutdown catheter; #12 sterile feeding tube; 3-0 silk ligatures; 3-0 silk suture with Keith needle; scalpel; Betadine; syringe; (See trauma tray)
4. Insert percutaneously 14 gauge catheter into right subclavian vein within 2 minutes (may use Seldinger technique)	3	3	1*	1*	1*	14 gauge 8" intracatheter; 30 cc non-luerlok (Regular tip) syringe; 2-0 silk suture with Keith needle; (See trauma tray)
5. Cutdown on greater saphenous vein(s) at ankle(s)	3	3	1*	1*	1*	Venous catheter; 14 gauge 2" cutdown catheter; #12 sterile feeding tube; 2-0 silk ligatures; 2-0 silk suture with Keith needle; scalpel; (see trauma tray)
6. Insert 14 gauge 2" long I.V. catheter	3	3	1*	1*	1*	Venous catheter; 14 gauge 2" cutdown catheter; #12 sterile feeding tube; 2-0 silk ligatures; 2-0 silk suture with Keith needle; scalpel; (See trauma tray)
7. Secure catheter with 2-0 silk ligatures and sutures	3	3	1*	1*		2-0 silk ligatures; suture
8. Establish I.V.			3	3	2	#14, #16, #18 gauge; alcohol wipes; tape; 4 X 4's 2 X 4's; tubing with I.V. solution
9. Insertion of percutaneous 14 gauge catheter 6" long into right internal jugular vein within 2 minutes.	3	3	1*	1*	1*	14 gauge 6" catheter; prep solution; drapes

## \*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

In all cases, the surgeon is a general surgeon and the specialty surgeon is a trauma surgeon, except for procedure 41, where a cardiac surgeon would be the optimal care provider.

In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.

Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

10. Draw from common femoral veins 60 cc blood for CBC, platelets, PT, PTT, fibrinogen, FDP, BUN, creatinine, $Na^+$ , $K^+$ , $Cl^-$ , $CO_2$ , BS, type and cross match or type and screen	3	3	2*	Syringe with needle; blood tubes; gauze; alcohol wipes; laboratory facilities
11. Draw from artery blood for ABG	3	3	2*	Blood gas syringe with needle; Heparin; 18 gauge arterial catheter; suture 2-0 silk; prep solution; scalpel with blade; bag with ice; (trauma tray)
12. Infuse normal saline	3	2	1	Normal saline; I.V. tubing; established I.V. line
13. Attempt catheterization of unused subclavian, common femoral veins and saphenous veins, and antecubital veins	3	3	1*	16 gauge intracatheter; 30 cc nonluerlok (regular tip) syringe; 2-0 silk ligatures; 2-0 silk suture with Keith needle (See trauma tray)
14. Measure blood pressure in arm	3	2	2	Blood pressure cuff; stethoscope
15. Insert percutaneously 18 gauge arterial catheter within two minutes in femoral artery	3	3	1*	18 gauge arterial catheter; alcohol wipes; gauze; tape
16. Attach arterial pressure monitoring tubing and flush	3	2	1*	Tubing, monitor with pressure capability; pressure bag with Heparin solution
17. Femoral artery cutdown	3	3	1*	Blood gas syringe with needle; Heparin; 18 gauge arterial catheter; suture 2-0 silk; prep solution; scalpel with blade; bag with ice; trauma tray; lidocaine
18. Give 2 units of type specific blood intravenously through blood warmer	2	2	1	Blood; blood tubing; saline solution; blood warmer; established I.V. line
19. Give 2 units of un-cross-matched blood intravenously through blood warmer	2	2	1	Blood; blood tubing; saline solution; blood warmer; established I.V. line
20. Complete transfusion as rapidly as possible	2	2	1	Cooler for blood and components; blood pump; syringes; tubing; blood warmers and tubing; lab supplies
21. Insert Foley catheter	3	3	1*	Lubricant; antiseptic cleansing solution; Indwelling Foley catheter; prefilled syringe; collection bag; various Foley catheters; temperature probe foley; Monitherm box
22. Perform percutaneous suprapubic cystostomy	3	3		Prep solution; gauze; cystostomy catheter; scalpel; clamps; drainage device
22a. Monitor urine output	3	3	1*	
23. Central venous pressure measurement	3	3	2	Prep solution; razor; sterile gloves; CVP catheter introducer; suture; dressing; tape; chest X-ray; Foley catheter; CVP monitoring system

24. Do needle thoracentesis in hemithorax with untreated pneumothorax	3	3	1*	1*	1*	#10, 12, 14 angiocatheter; 1 1/2 finger glove/rubber band tape; Heimlich valve; (flutter valve/stop cock)
25. Insert chest tube in hemithorax with tension pneumothorax and attach to -20 cm H <sub>2</sub> O suction	3	3				Chest tube (sizes #28, #32, #36) catheters; scalpel; Betadine prep; large curved clamp; chest drainage collector device; zyllocaine/syringe; 4 x 4's; suture; needle holder
25a. Reposition endotracheal tube if present	3	3	1*	1*	1*	Endotracheal tube; tape; viscous lidocaine; drugs for sedation
26. Manually compress proximal and distal bleeding sites	3	3	2*	2*	2*	Compression dressings
27. Apply tourniquet above amputation site and tighten until bleeding stops	3	3	2*	2*	2*	4 x 4's; sterile gauze; tourniquet Ace wraps
28. Clamp and tie axillary artery and vein	3	3				Vascular clamps; suture; dressings
29. Pack amputation site with sterile gauze and manually compress	3	3	1*	1*	1*	Sterile gauze; dressing; ABD dressings; tourniquet
30. Clamp and tie femoral artery	3	3				Vascular clamp; suture; dressing; tape
31. Apply up to 5 vascular clamps to arterial and venous bleeders	3	3				Vascular clamp; suture; dressing; tape
32. Apply vascular clamps proximal and distal to injured blood vessel	3	3				Vascular clamp; suture; dressing; tape
33. Secure clamps with sutures to prevent dislodgement	3	3				Vascular clamp; suture; dressing; tape
34. Venous blood drawing			3	3	2*	Syringe with needle; blood tubes
35. Insert percutaneously or by cutdown 22 gauge 2" catheter into radial artery	3	3	1*	1*	1*	Percutaneous: 22 gauge 2" catheter Cutdown: Blood gas syringe; Heparin; 18 gauge arterial catheter; suture 2-0 silk; prep solution; scalpel with blade; bag with ice; trauma tray
36. Continue further efforts at clinician's discretion	3	3				
37. Insert bilateral chest tubes	3	3				Chest tube (sizes #28, #32, #36) catheters; scalpel; Betadine prep; large curved clamp; chest drainage collector device; zyllocaine; syringe; 4x4's; suture; needle holder
38. Splash Betadine on anterior chest wall. Drape and do median sternotomy; pericardiotomy	3	3				Betadine; sterile drape; sternotomy OR list

39 Put in right atrial 3 3  
purse string and insert  
16 French I.V. tubing.  
Secure with purse string

16 French I.V. tubing

40. Clamp sub-diaphragmatic 3 3  
aorta

Clamp

41. Put in right atrial 3 3  
and right ventricular  
pacing wires and attach  
to A-V sequential  
pacemaker

Pacing wires; AV sequential pacemaker;  
needle; pacing cable

42 Attempt defibrillation 3 3 Nurse or corpsman  
at 30 watts must assist

Defibrillator; sterile internal paddles

AMPUTATION - EXTREMITY EQUIPMENT LIST

SUTURE

-----  
VICRYL 0 STRAND  
VICRYL 2-0 STRAND  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
ETHILON 3-0 CUTTING

SUPPLIES

-----  
DRAPE, SPLIT SHEET  
DRAPE, MEDIUM 44 X 60"  
MAYO STAND COVER  
TOWELS, STERILE (6)  
GLOVES, SURGEON ASSORT. SIZES  
GOWN, SURGICAL XTR. LRG.  
BASIN SET W/ GRADUATE & MED.CUP.  
SPONGE, LAP 18 X 18 (2)  
PAD, GROUNDING  
CAUTERY, HANDSWITCH  
SUCTION TUBING 20'  
IRRIG. WATER 1500 CC  
IRRIG. NACL 1000 CC  
BLADE, SURGICAL #10 (2)

INSTRUMENTS & EQUIPMENT

-----  
AMPUTATION SET  
ORTHOPEDIC SET  
BLADE, GIGLI  
CAUTERY, MACHINE

DRESSING

-----  
XEROFOAM 5 X 9"  
GAUZE 4 X 9" 12 PLY  
ABD, LARGE  
ELASTIC 4" X 5'  
ELASTIC 6" X 5'

AMPUTATION SET EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

1 AMPUTATION SAW  
1 LEWEN BONE HOLDER  
3 GIGLI SAW HANDLES  
2 DEEP RAKES  
1 STAINLESS STEEL RASP  
1 STAINLESS STEEL FILE  
1 LANGENBECK PERI ELEVATOR

PEEL PACK:  
-----

1 AMPUTATION KNIFE

ON STRINGER:  
-----

6 CURVED CRILES



CARDIO VASCULAR TRAY

BOTTOM LAYER

-----  
#7 KNIFE HANDLE  
STRULLY SCISSOR  
POTTS SCISSORS - 25, 45, 60 DEG  
NARROW TIP SUTURE SCISSOR

SECOND LAYER

-----  
30 DEG PERIPHERAL CL (BLACK)  
ACUTE ANG MINATURE CLAMPS  
STR ATRAGRIP CLAMPS  
30 DEG DEBAKEY MINATURE CLAMPS  
LONG ALLISES

THIRD LAYER

-----  
LONG ATRAGRIP TISSUE FCPS  
MED ATRAGRIP TISSUE FCPS  
SH ATRAGRIP TISSUE FCPS  
LONG FINE TIPPED N.H.  
MED N.H.  
SH FINE TIPPED N.H.

FOURTH LAYER

-----  
TANGENITAL OCCLUSION CL (LG ANG  
SATINSKY)  
SEMB CLAMP  
KIDNEY PEDICLE CLAMP

CHEST SET (THORACIC) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER

GIERTZ RIB CUTTER

DOYEN ELEVATORS (1 LT & 1 RT)

ALEXANDER

MATSON

RIB APPROXIMATORS (MOVEABLE)

ADSON RONGEUR

TONSIL SUCTION

VEIN RETRACTORS

DEEP RAKES

SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH

LONG FINE THUMBS W/OUT TEETH

EXTRA LONG RUSSIAN

EXTRA LONG THUMB W/OUT TEETH

LONG ATTRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR

EX LONG N.H.

EX LONG FINE N.H.

EX LONG CURVES

EX LONG CARHUALT

REGULAR CARHUALTS

EX LONG RUMEL

BRONCHUS CLAMPS

RUMEL THORACIC ARTERY CLAMPS

DUVAL LUNG CLAMPS SEMB

SEMB

LONG ALLISES

MEDIUM NEEDLE HOLDERS

LONG NEEDLE HOLDER -NOT FINE

SPONGE STICKS

LONG CURVES

LAUERS

TONSILS

ROCKERS - CLAMP

HABCOCK CLAMP

ALLIS CLAMP

CURVED CRILER

CURVED MOSQUITOES CLAMP

SUTURE SCISSORS

MAYO SCISSORS

METZ SCISSORS

LONG METZ SCISSORS

CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATTRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
TONSILS  
MEEKER  
KIDNEY PEDICAL CLAMP  
REGULAR RUMELS  
REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR  
PEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES  
#3 LONG KNIFE HANDLE

EXTRA LONG INSTRUMENTS

CONTENTS

---

EXTRA LONG NEEDLE HOLDER  
EXTRA LONG FINE NEEDLE HOLDER  
EXTRA LONG CURVES  
REGULAR RUMEL  
MEEKERS  
BRIDGE FORCEPS  
EXTRA LONG ALLISES  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB WITHOUT TEETH  
LONG BABCOCKS  
EXTRA LONG METZ

# MEDIANSTERNOTOMY EQUIPMENT LIST

## SUTURE

MAXON 2-0 T-25  
MAXON 3-0 t-25  
SILK 3-0 SH  
SILK 2-0 SH  
SILK 3-0 STRAND  
SILK 2-0 STRAND  
STAPLE LOADING UNIT SM-35W

## SUPPLIES

BASIN, MAJOR SET  
GOWN, STER BACK LRG  
GOWN, STER BACK XLRG  
SHEET, LAB  
SHEET, MEDIUM  
TABLE COVER  
TRAY, SKIN SCRUB

## GLOVES

GLOVES, EXAM LRG UNSTERILE  
GLOVES, TRIPLEX

## CAUTERY

CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, LECTROSWITCH HANDSWITCH

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #21  
BONE WAX W-31G  
DACRON TAPE 8618-00  
DURA HOOKS, (FISH HOOKS)  
MAGNETIC INSTRUMENT MAT  
MAGNETIC NEEDLE MAT  
NEEDLE, SPINAL 22 GA X 3 1/2  
SYRINGE, 30CC LL  
SYRINGE, BULB

## SPONGES

SPONGE, 18 X 18 LAP  
SPONGE, GAUZE X-RAY DETECT  
SPONGE, KITTNER DISSECTORS

## SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

## SOLUTIONS

SOLUTION, IRRIG WATER 1500ML  
SOLUTION, IRRIG NACL 1000

## INSTRUMENTS & EQUIPMENT

CARDIOVASCULAR TRAY  
CHEST SET  
EX. LONG INSTRUMENTS  
HEADLIGHT  
LAP SET  
N H, EX LONG  
RETR, HIMMELSTEIN  
RETR, MOARSE  
STERNAL SAW  
SCISSOR, LONG FINE METZ  
TRAUMA CHEST TRAY

## DRAINS

CHEST TUBE 32PR THORACIC  
CHEST TUBE 36FR THORACIC  
PLEUROVAC, ADULT

## DRESSINGS

DRESSING, GAUZE 4X6 12 PLY  
DRESSING, TELFA

## VASCULAR

FELT 3 X 3  
SUTURE BOOTS  
VESSEL LOOPS, MAXI  
VESSEL LOOPS, MINI

ORTHOPEDIC SET EQUIPMENT LIST

-----  
CONTENTS  
-----

ON STRINGER:  
-----

2 SHORT N.H.  
2 MEDIUM N.H.  
1 LEWEN BONE CLAMP  
1 LONG CURVE  
1 LAUER  
4 OCHNERS  
2 GYNE ALLISES  
2 REGULAR CURVES  
4 CURVED CRILES  
2 CURVED KELLIES  
1 SUTURE SCISSOR  
1 BANDAGE SCISSOR  
1 MAYO SCISSOR  
1 METZ SCISSOR  
6 REGULAR TOWEL CLIPS

BOTTOM OF PAN:  
-----

2 ARMY/NAVYS  
2 SHARP RAKES  
2 WIDE HIBBS  
2 NARROW HIBBS  
2 LARGE TAYLOR  
1 SMALL TAYLOR  
2 BENNETTS  
1 ADSON RONGEUR  
2 MEDIUM WEITLANERS  
1 LANGENBECK  
1 PLIER  
1 MALLET  
1 POINTED RONGEUR  
1 SMALL PIN CUTTER  
6 BALL CLIPS

PEEL PACK:  
-----

2 #3 KNIFE HANDLES  
1 #4 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
1 TONSIL SUCTION  
1 #12 FRAZIER SUCTION  
1 LONG THUMB W/TEETH  
2 FINE GYNES  
2 MEDIUM RUSSIANS  
2 ADSONS W/TEETH

PEEL PACK:  
-----

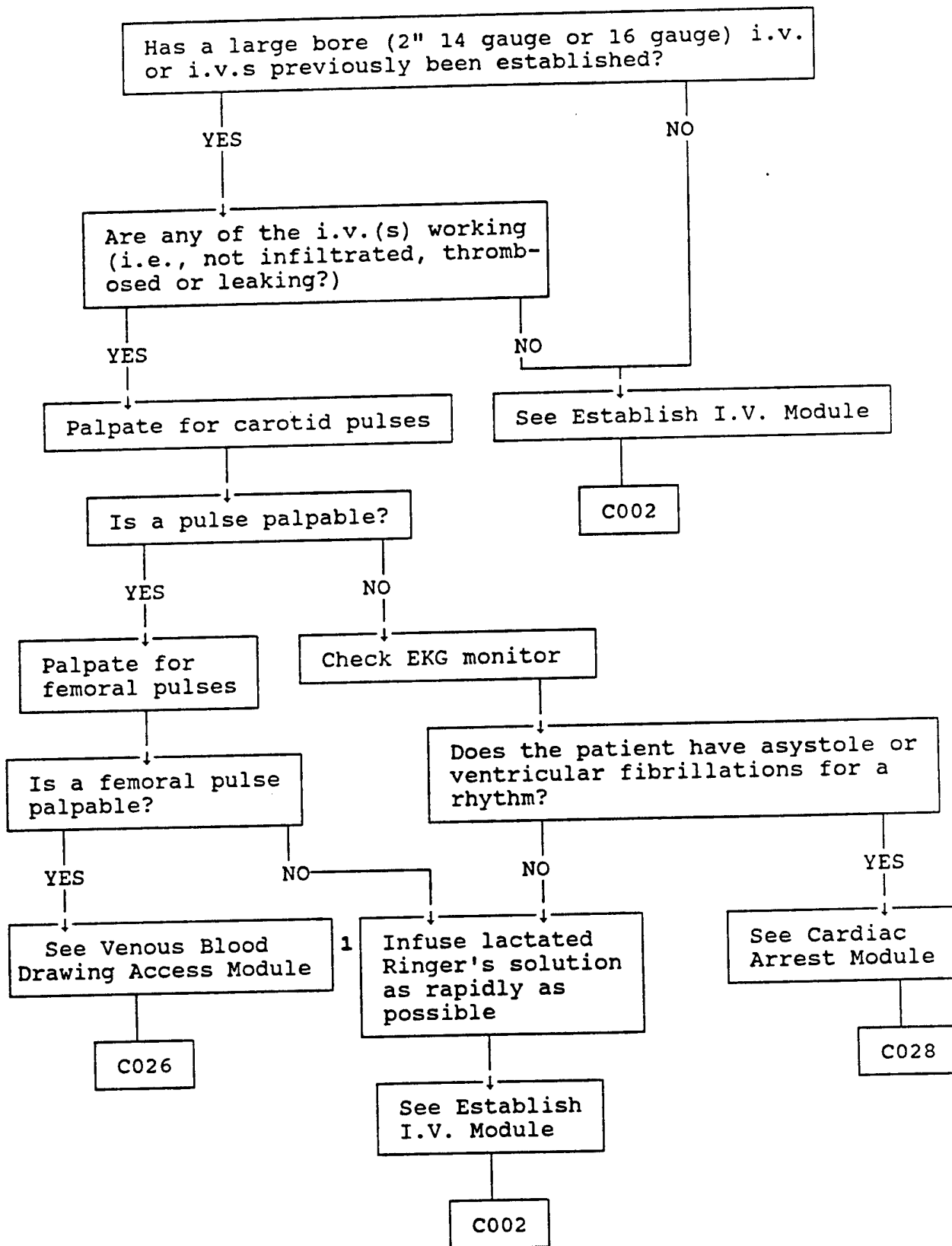
1 1/4" DRILL BIT  
1 7/64" DRILL BIT  
1 SMALL METAL RULER

TRAUMA CHEST TRAY - Minimal equipment

-----

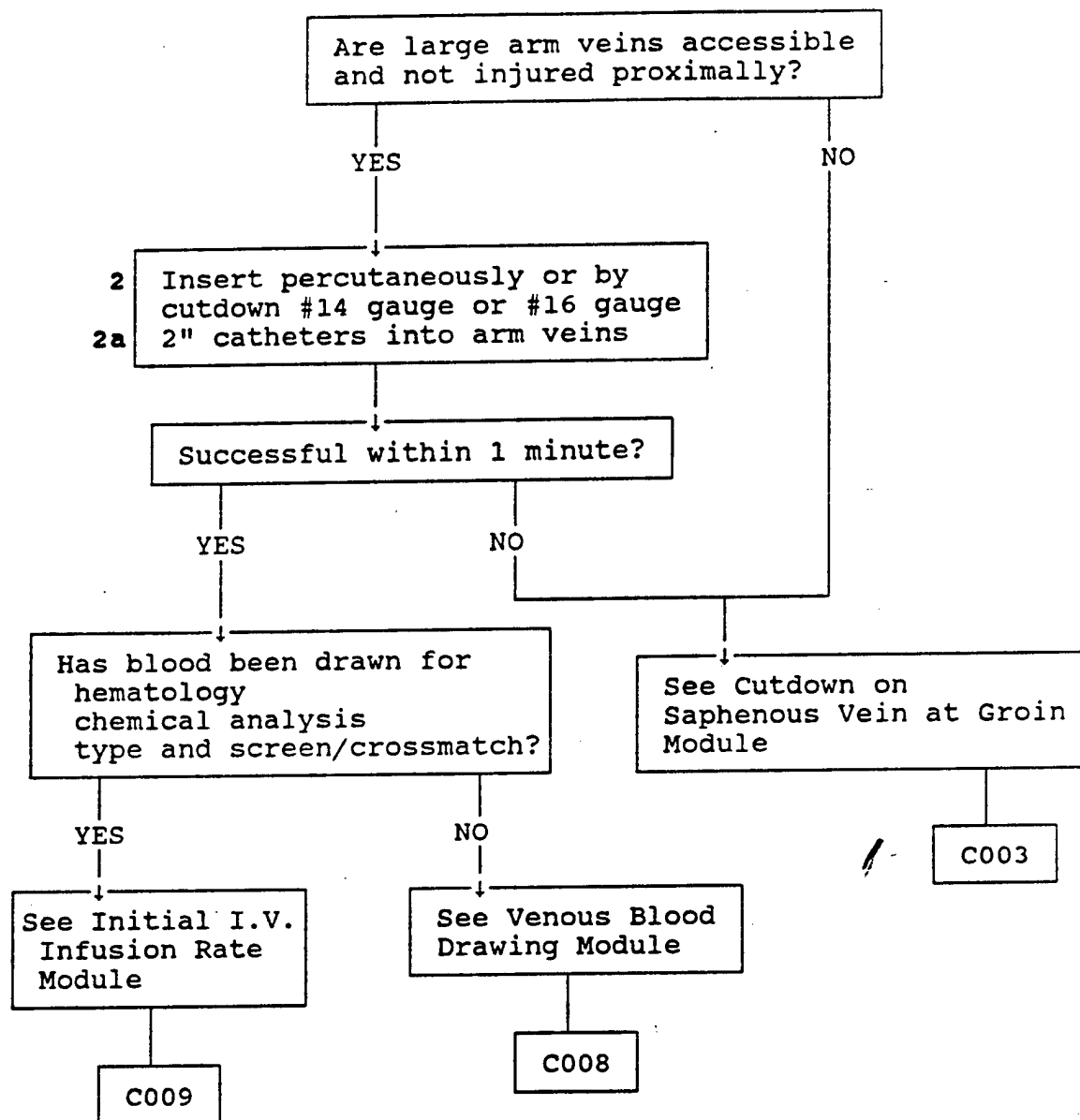
- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
  - STERNAL SAW/LEBSCHKE
  - BETADINE PREP
  - SUTURE FOR REPAIR
  - SUCTION
  - CHEST TUBES
  - DRAINAGE SYSTEM

CIRCULATION MODULE

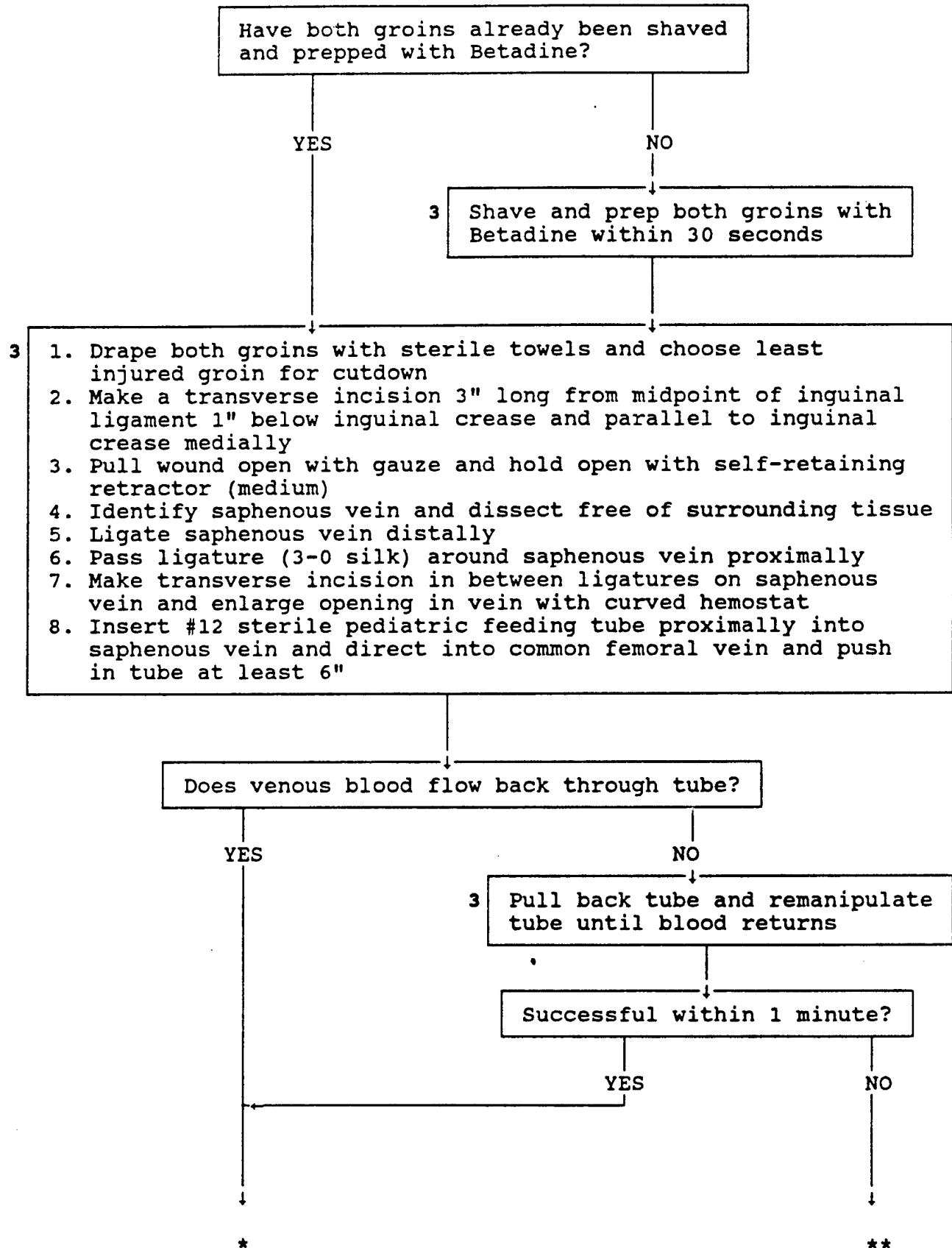


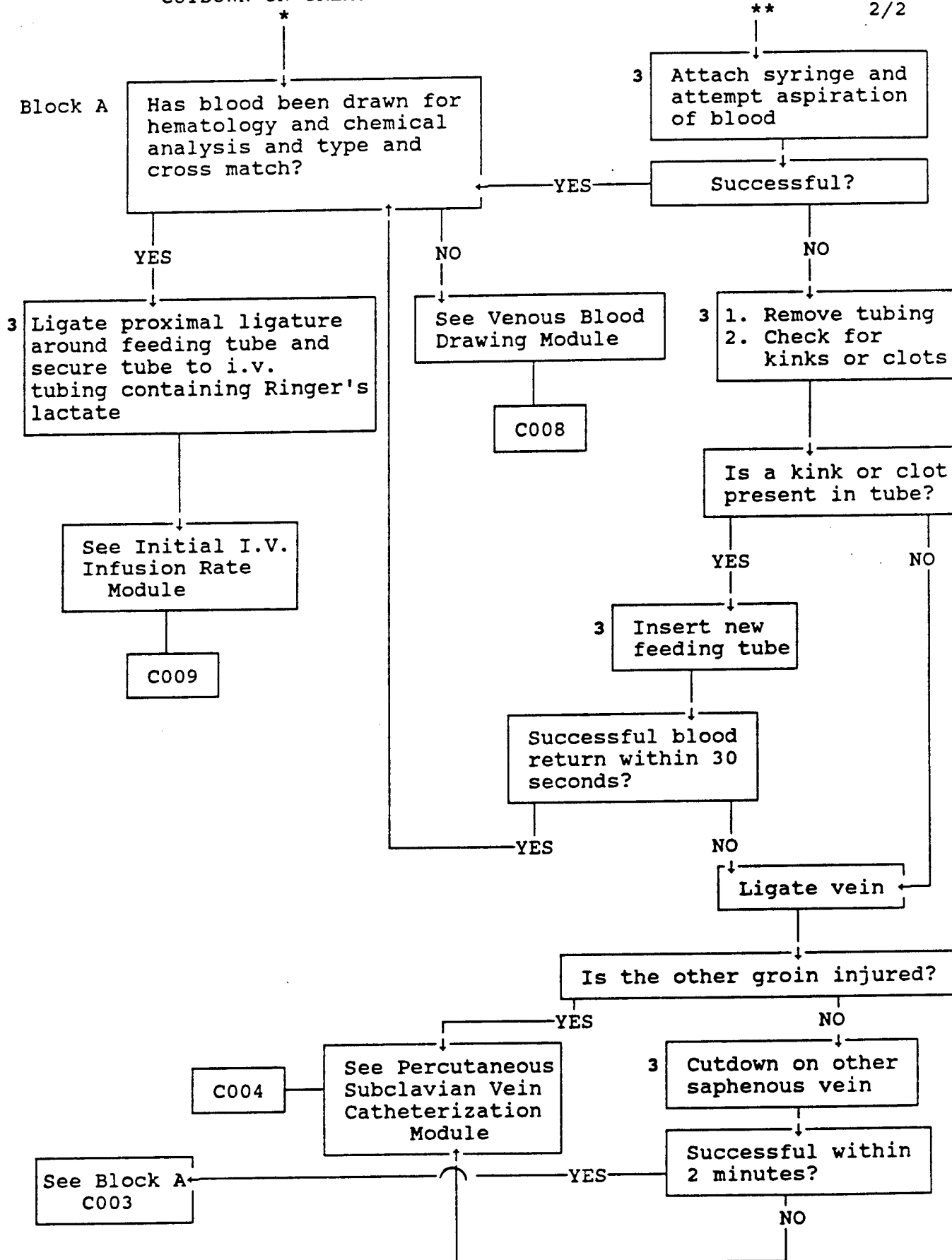


ESTABLISH I.V. MODULE

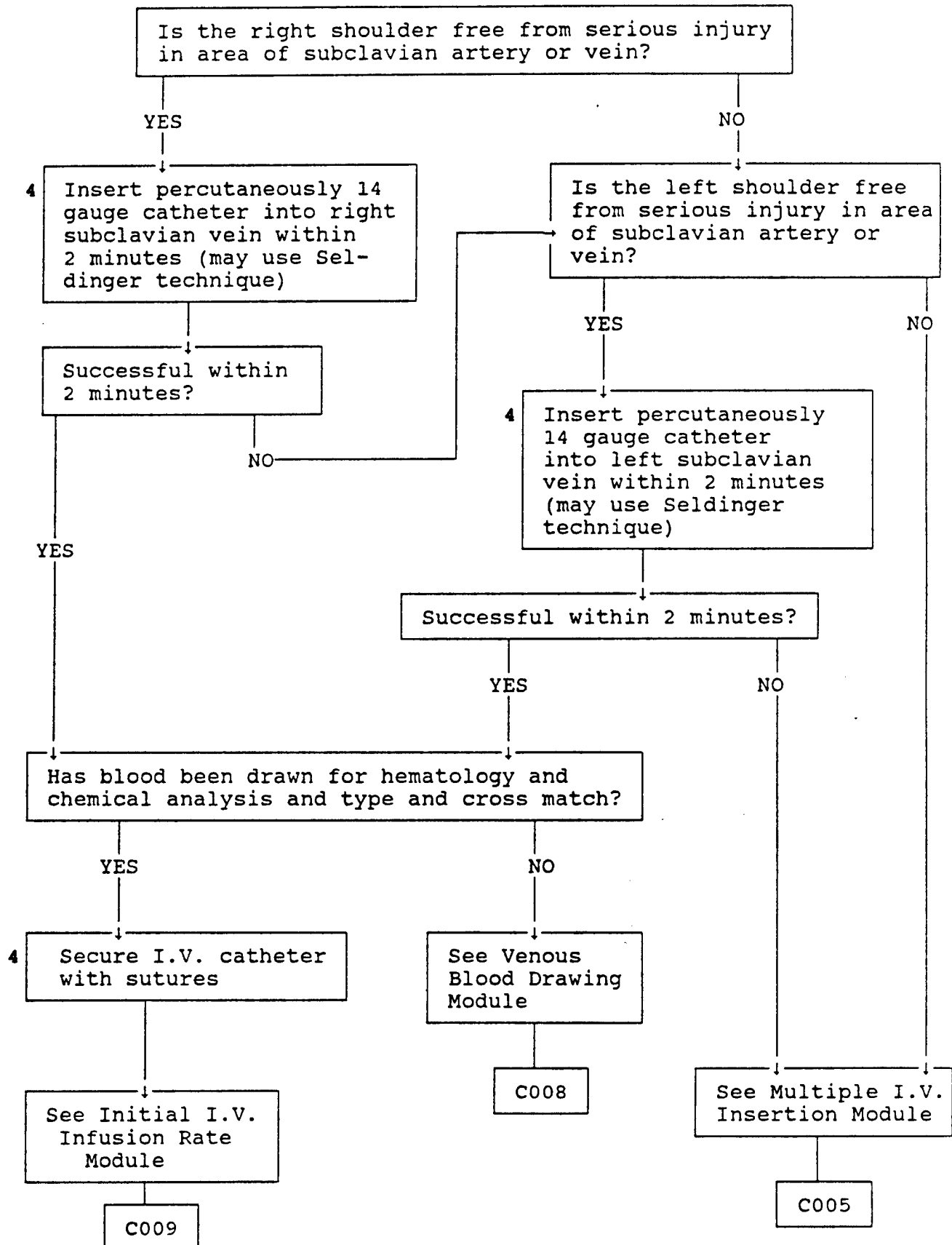


CUTDOWN ON GREATER SAPHENOUS VEIN AT GROIN MODULE

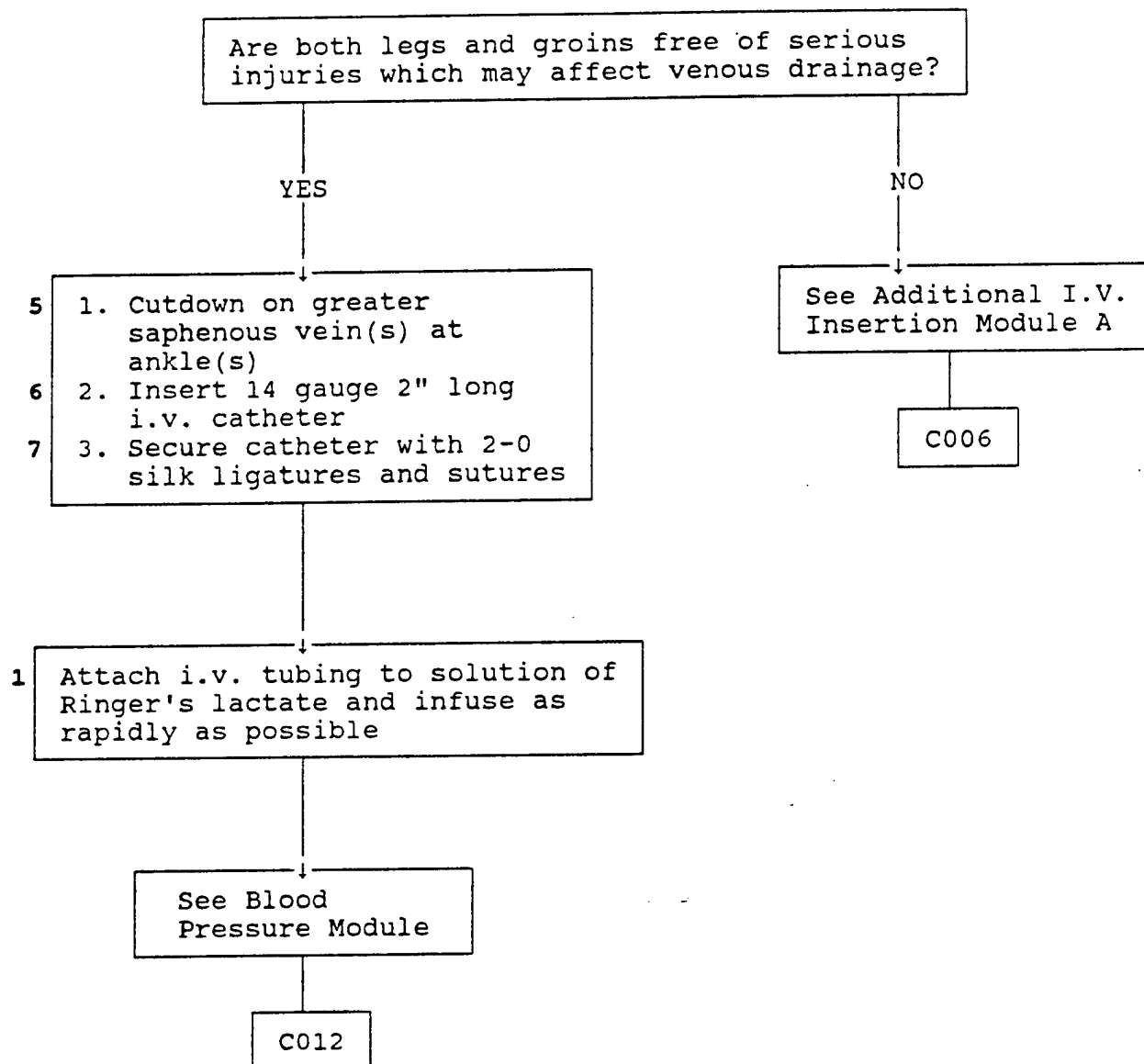




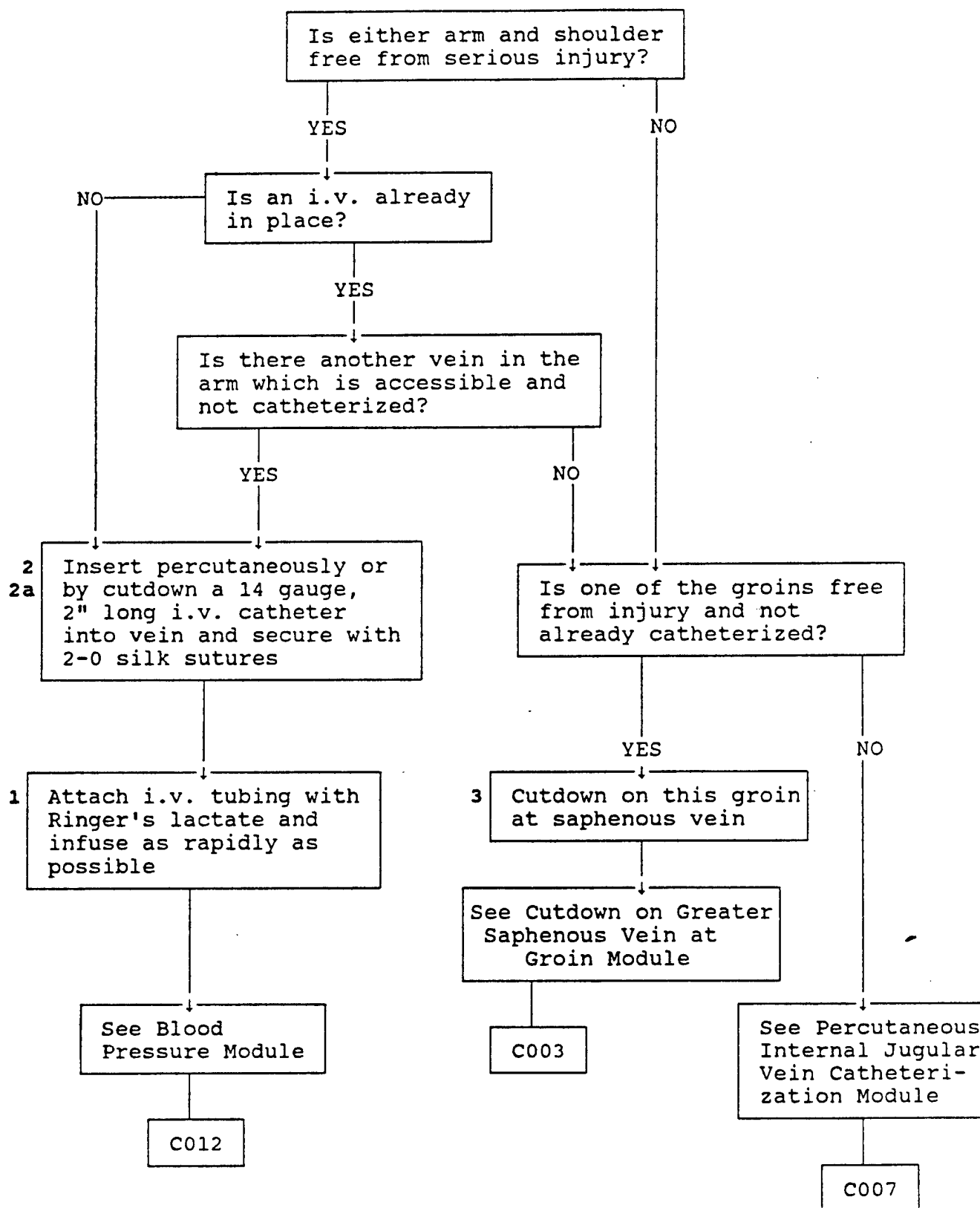
PERCUTANEOUS SUBCLAVIAN VEIN CATHETERIZATION MODULE



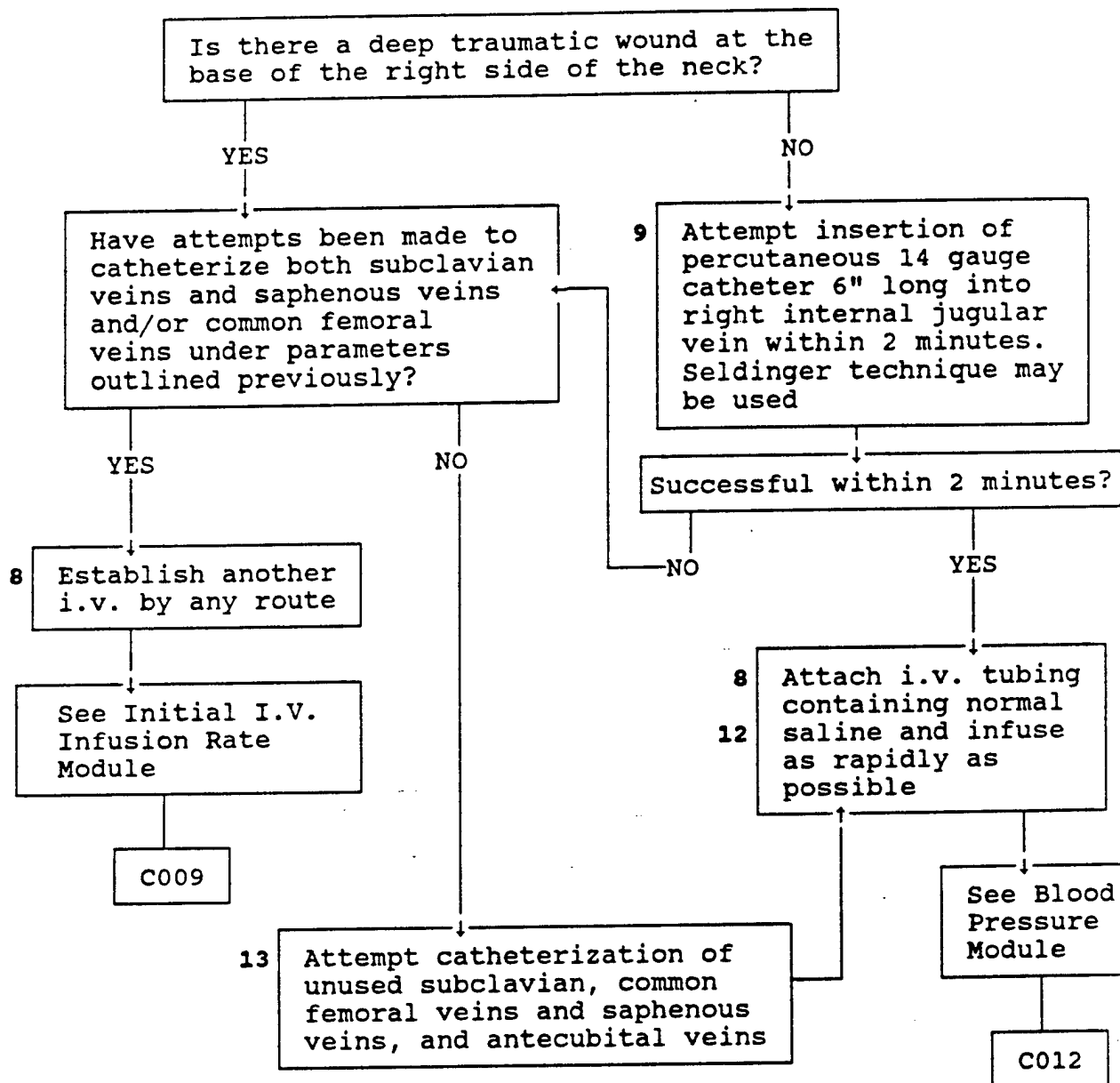
MULTIPLE I.V. INSERTION MODULE



ADDITIONAL I.V. INSERTION MODULE



PERCUTANEOUS INTERNAL JUGULAR VEIN CATHETERIZATION MODULE



VENOUS BLOOD DRAWING MODULE

10 Draw from common femoral vein. 60 cc blood for CBC, platelets, PT, PTT, fibrinogen, FDP, BUN, creatinine, Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, CO<sub>2</sub>, BS, type and cross match or type and screen

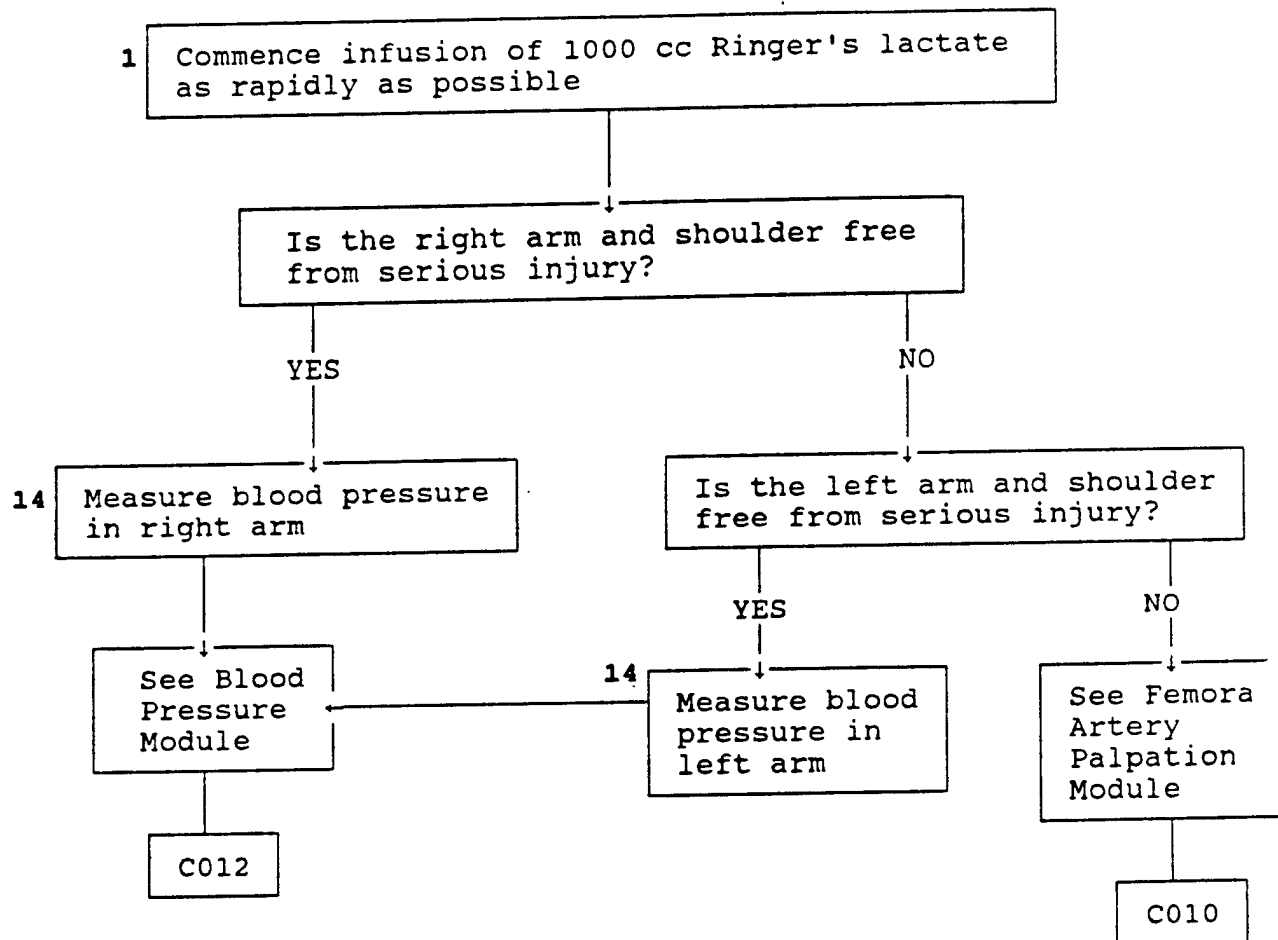
11 Draw from either common femoral artery blood for ABG

See Initial I.V.  
Infusion Rate  
Module

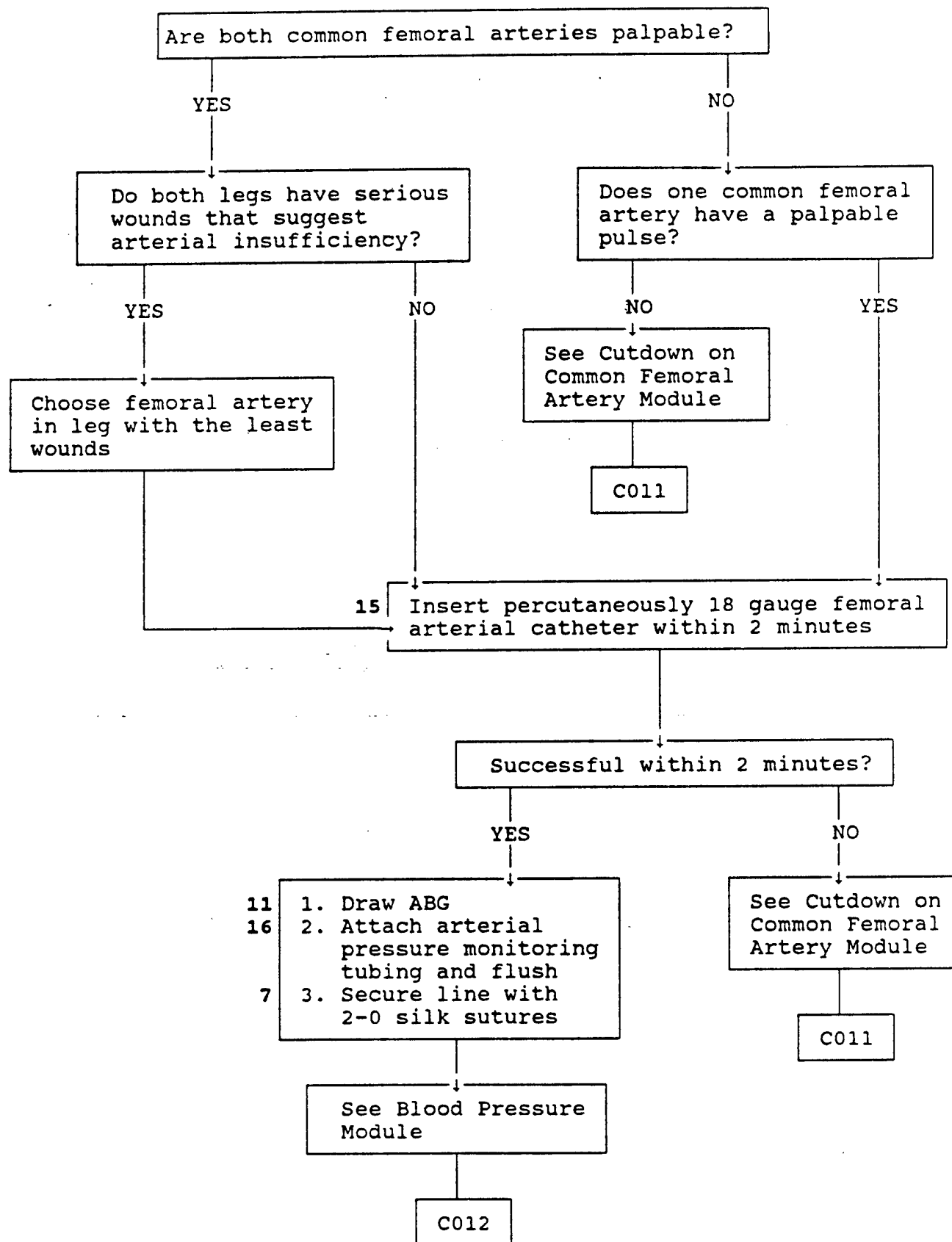
C009



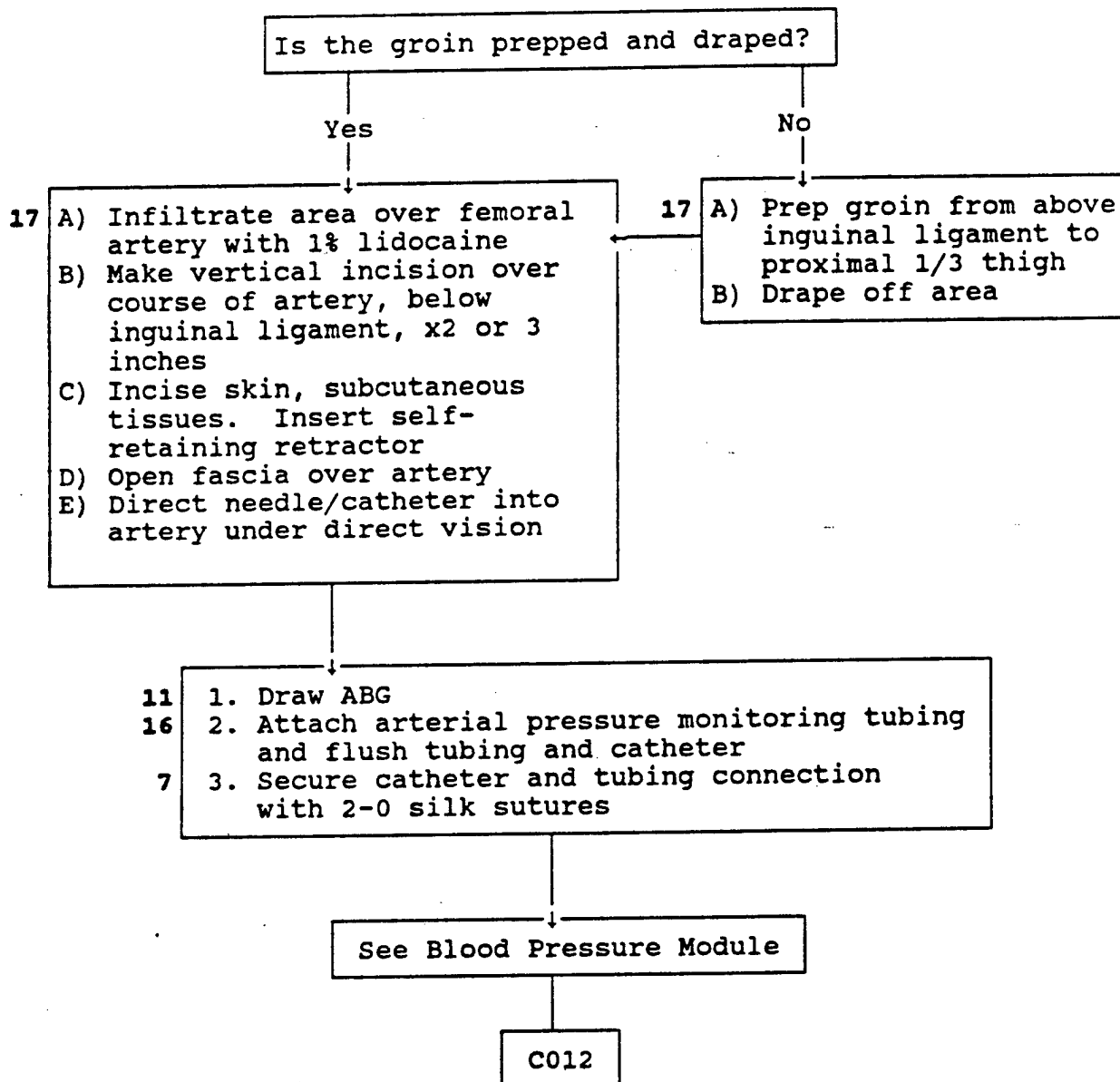
INITIAL I.V. INFUSION RATE

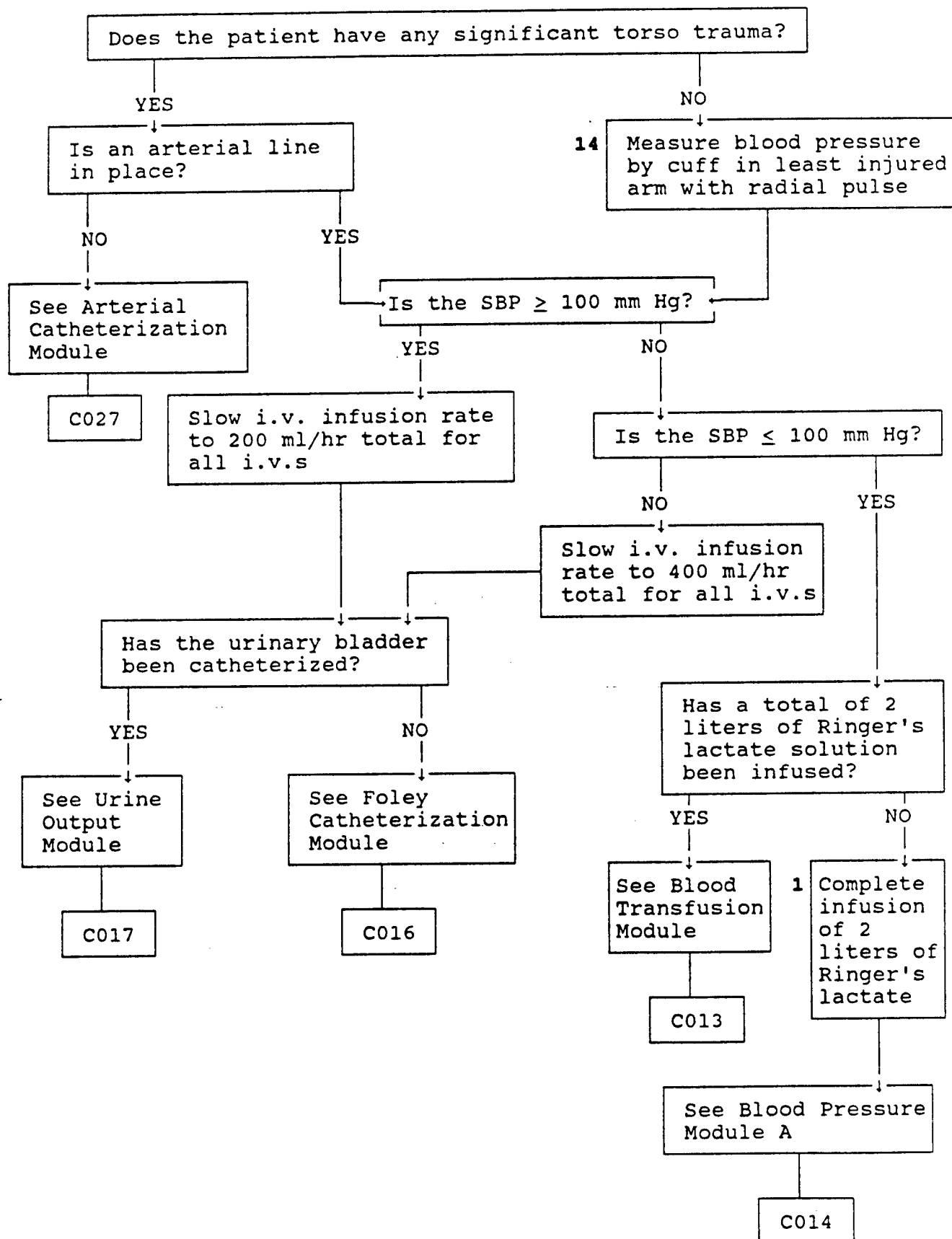


FEMORAL ARTERY PALPATION MODULE

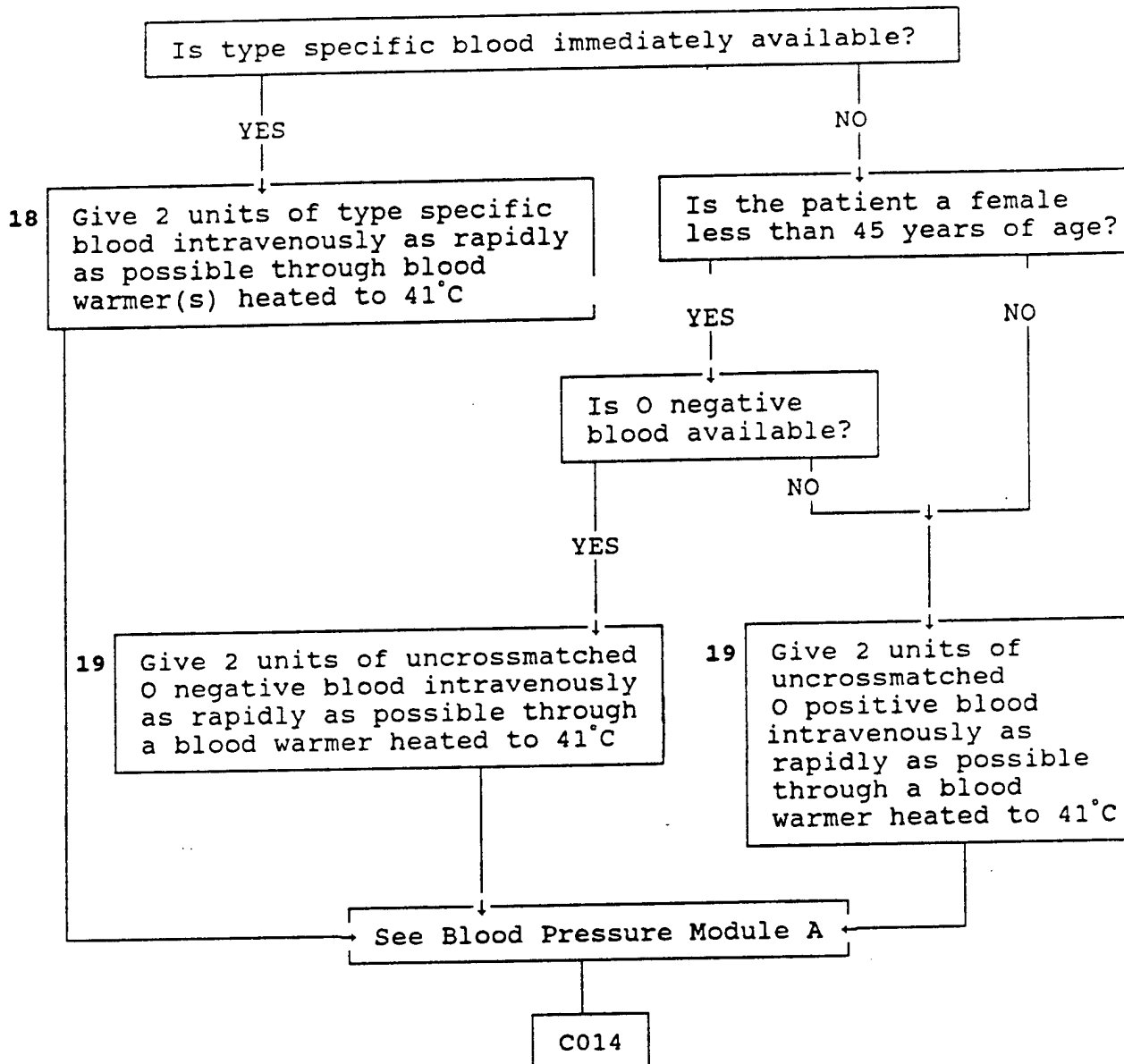


CUTDOWN ON FEMORAL ARTERY



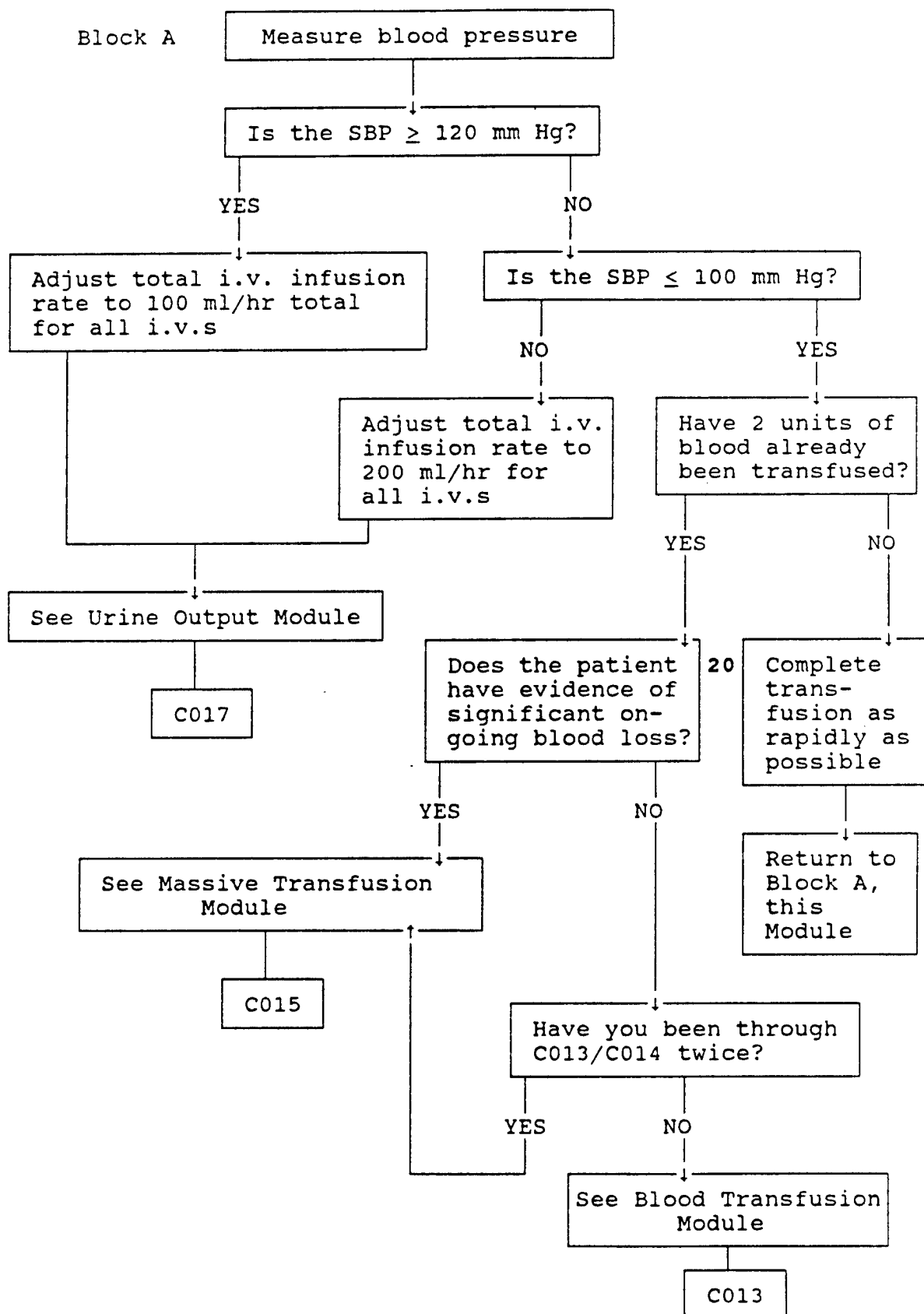


BLOOD TRANSFUSION MODULE



BLOOD PRESSURE MODULE A

Block A



MASSIVE TRANSFUSION MODULE

Initiate massive transfusion protocol

Blood Bank will immediately provide 10 units  
of type of blood requested:  
    Uncross-matched  
    and/or Type specific  
and will immediately process:  
    10 units platelets  
    10 units FFP/10 units cryoprecipitate  
    10 units packed cells  
in order to provide every 15 minutes:  
    4 units of packed cells  
    1 unit of FFP (500 ml) or  
        5 units cryoprecipitate  
    5 units of platelets

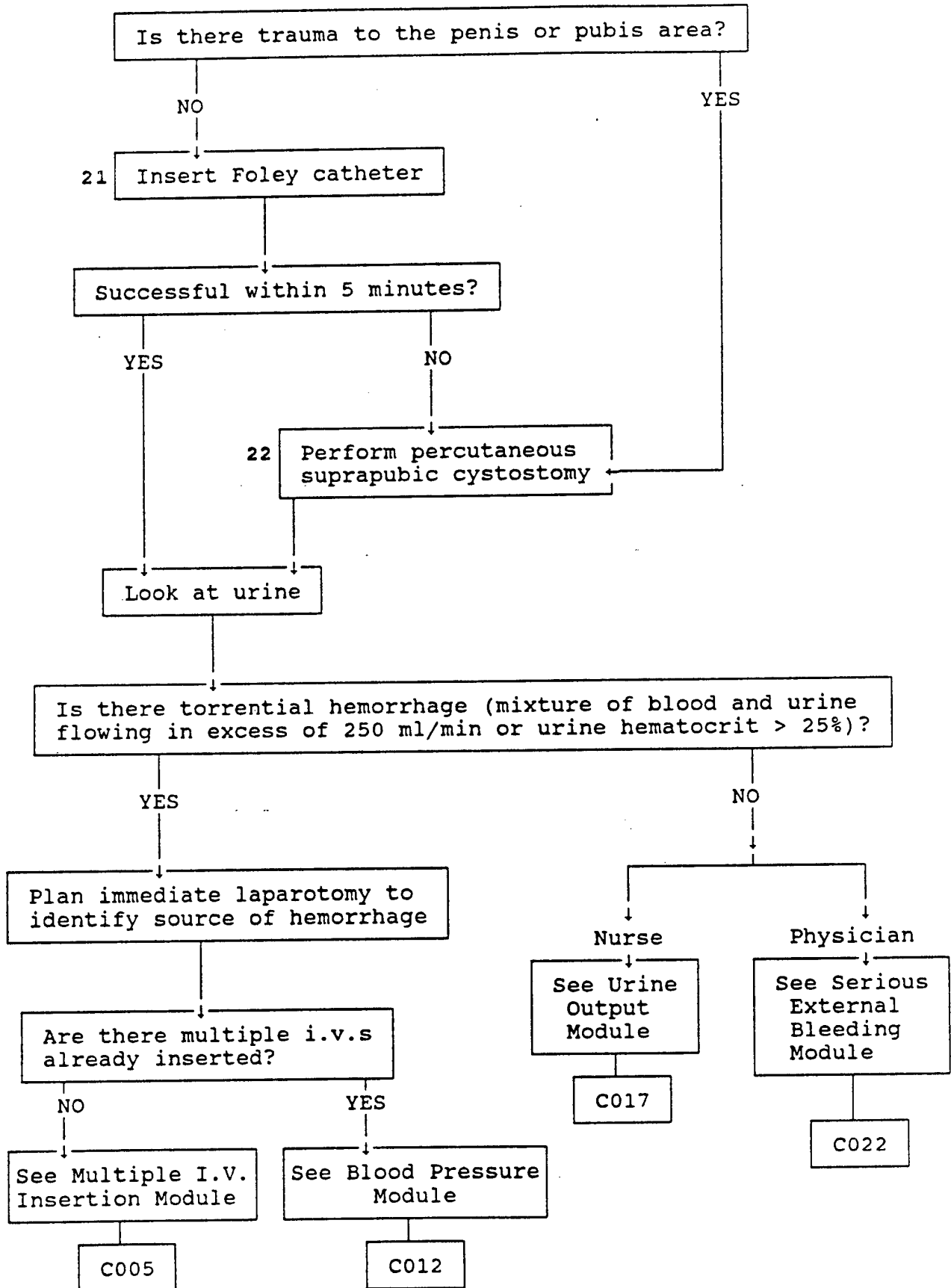
11 Have monitoring nurse draw  
from arterial line every  
30 minutes, blood for:  
    ABG  
    HCT  
    Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>++</sup> (ionized)  
    Platelets  
    PT, PTT  
    Fibrinogen  
    FDP  
to assess adequacy of transfusion  
and status of clotting mechanism

See Foley Catheterization Module

C016

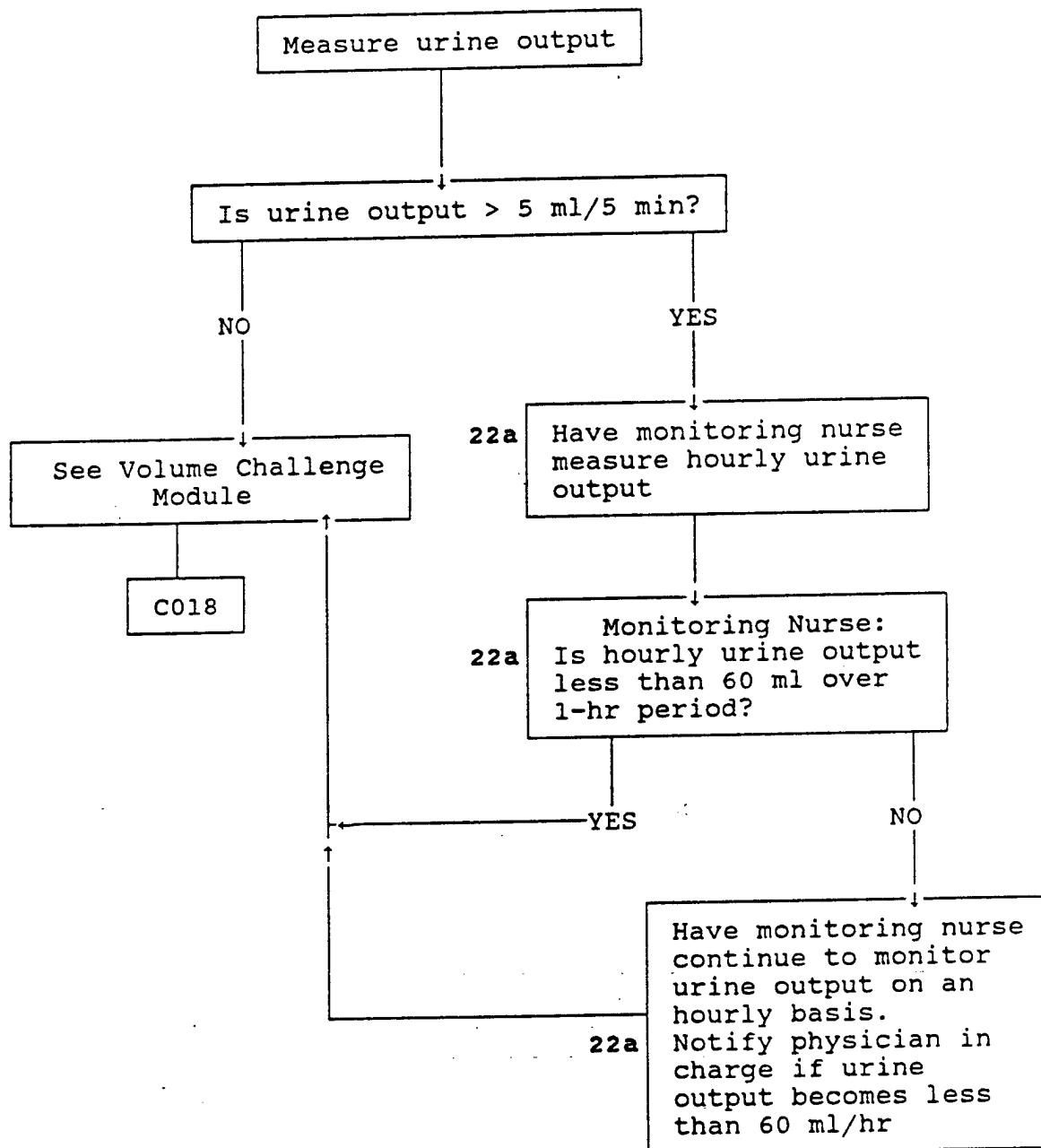
FOLEY CATHETERIZATION MODULE

C016  
1/1

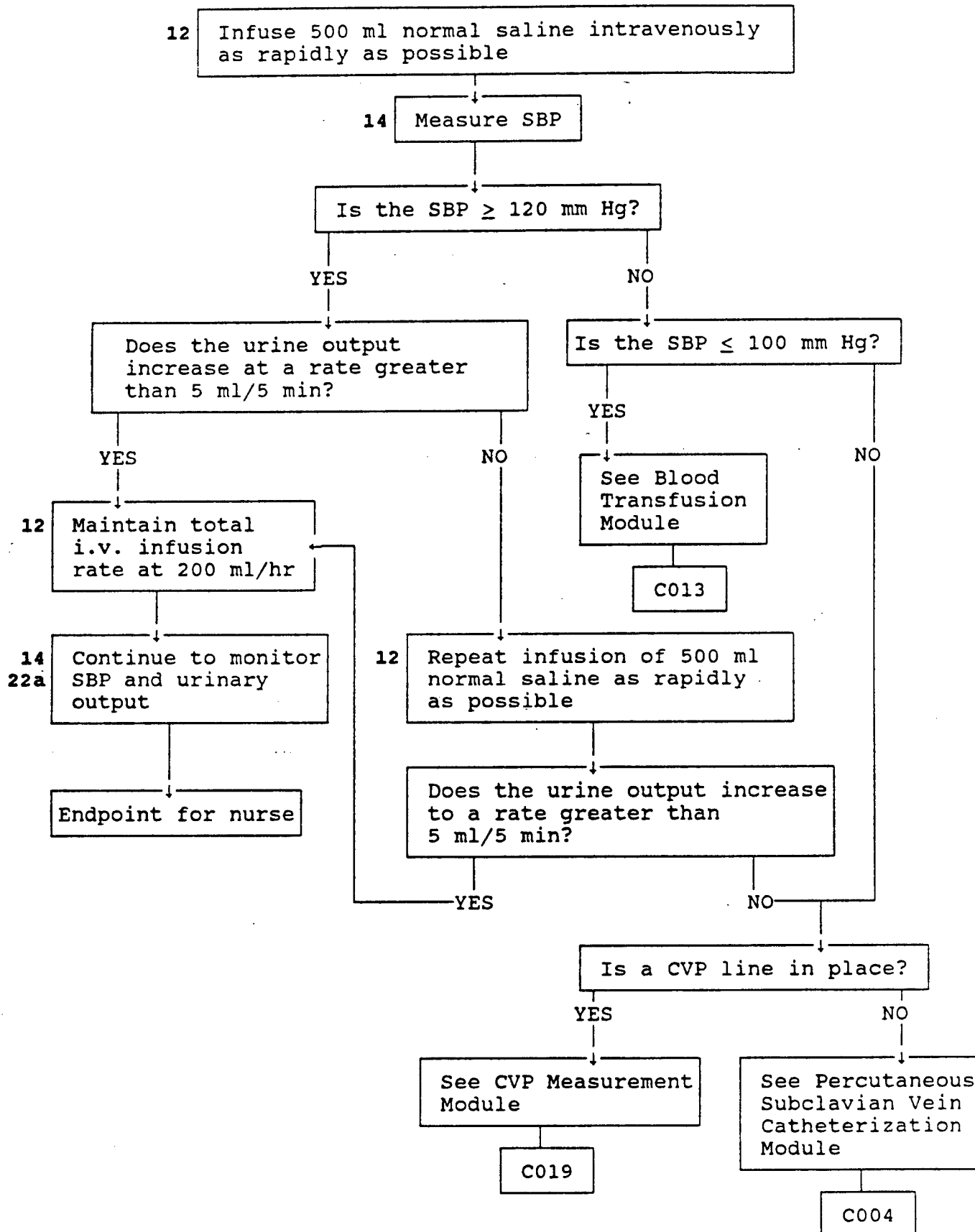




URINE OUTPUT MODULE

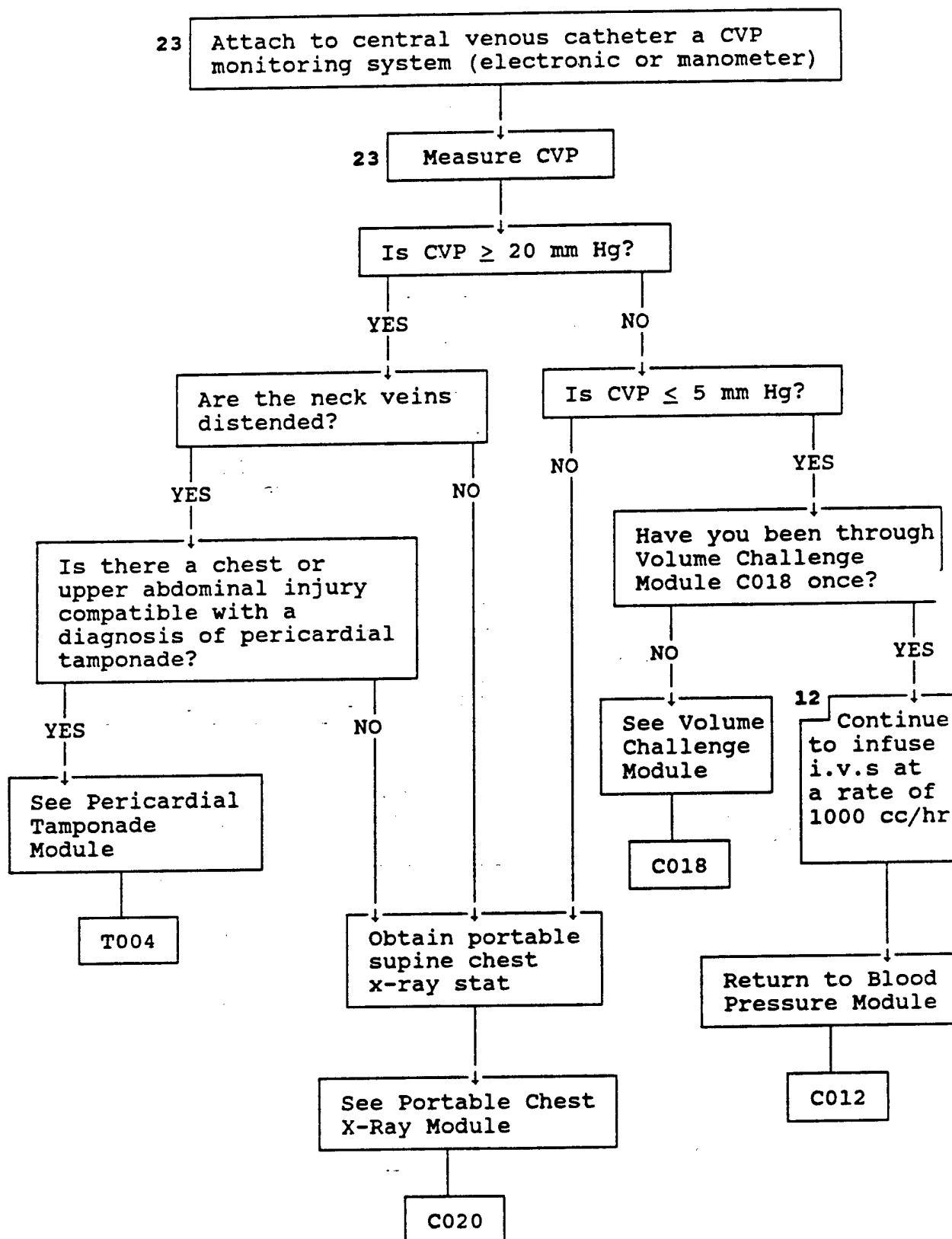


Monitoring Nurse:



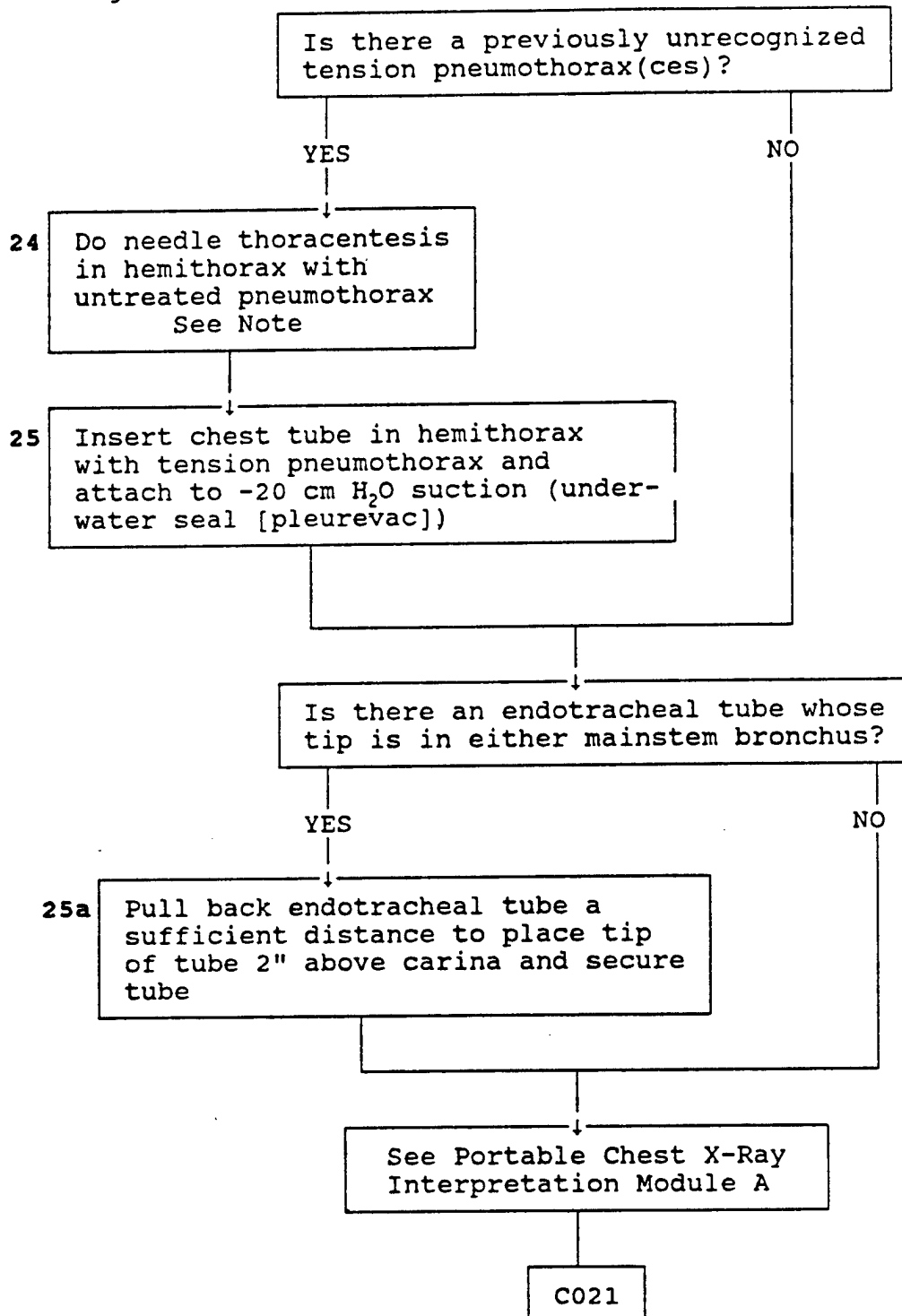
CENTRAL VENOUS PRESSURE MEASUREMENT MODULE

Monitoring Nurse:



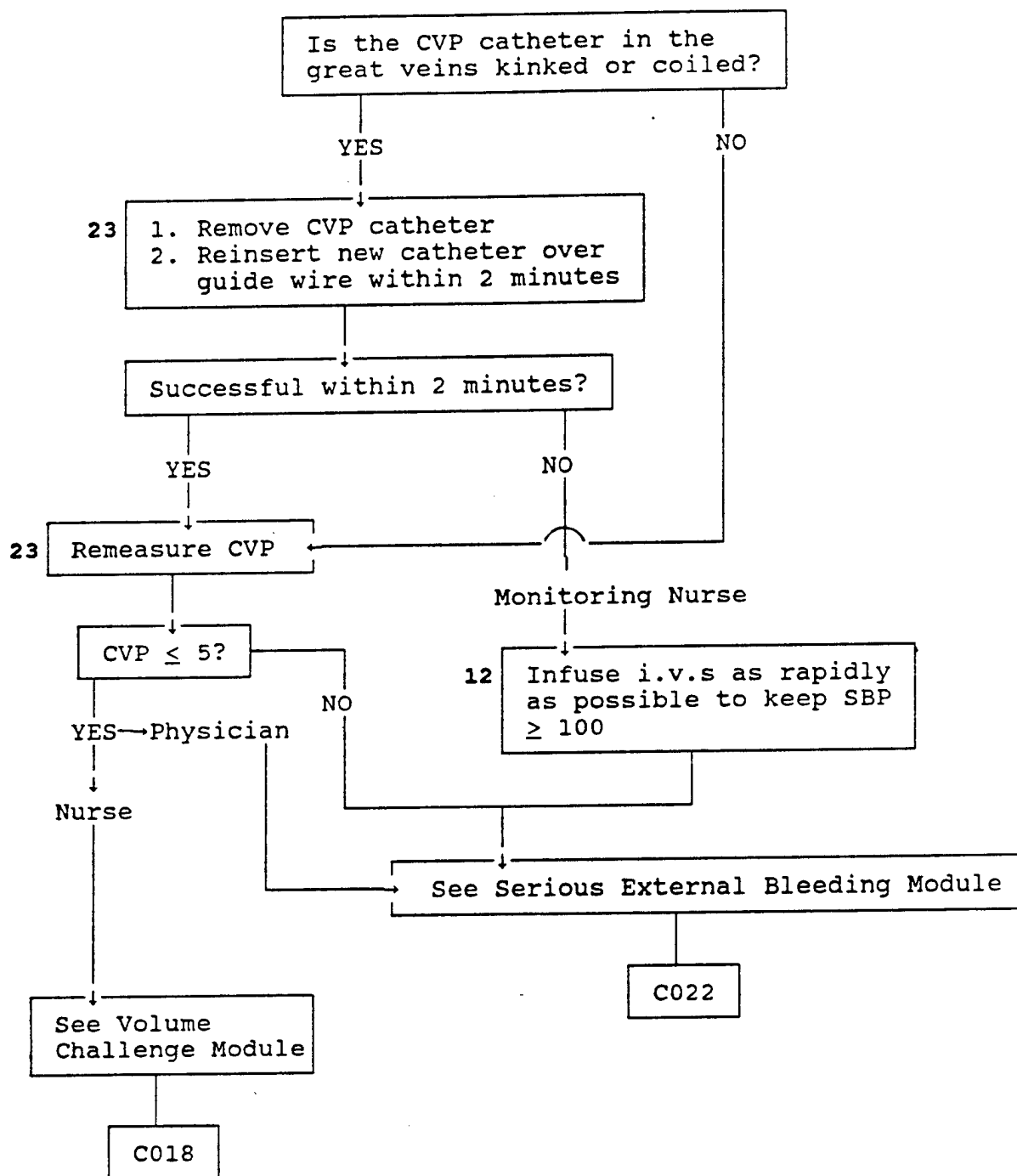
PORTABLE CHEST X-RAY INTERPRETATION MODULE

Surgeon:

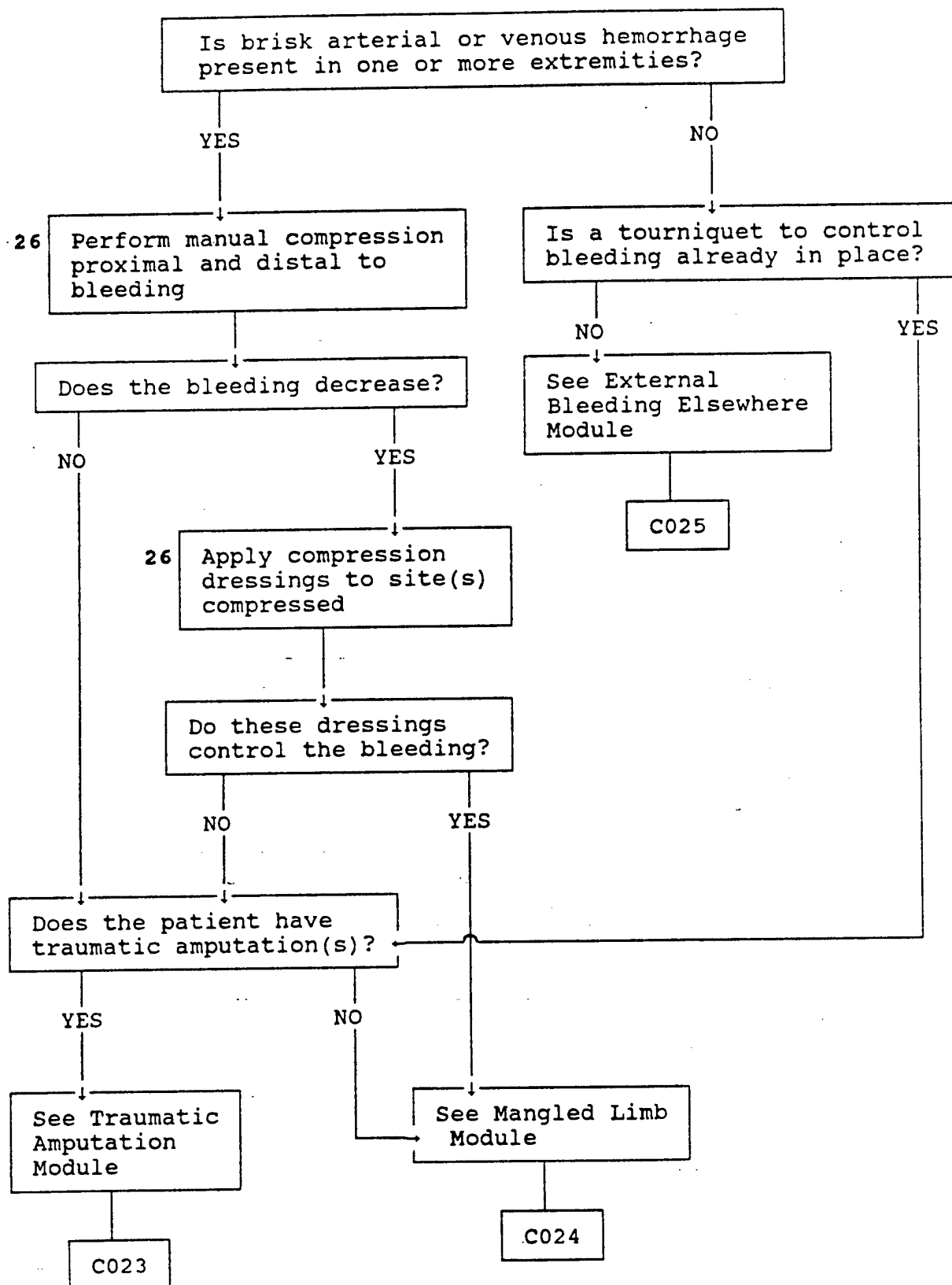


Note: See Needle Thoracentesis  
Module B007 for technique

PORTABLE CHEST X-RAY INTERPRETATION MODULE A

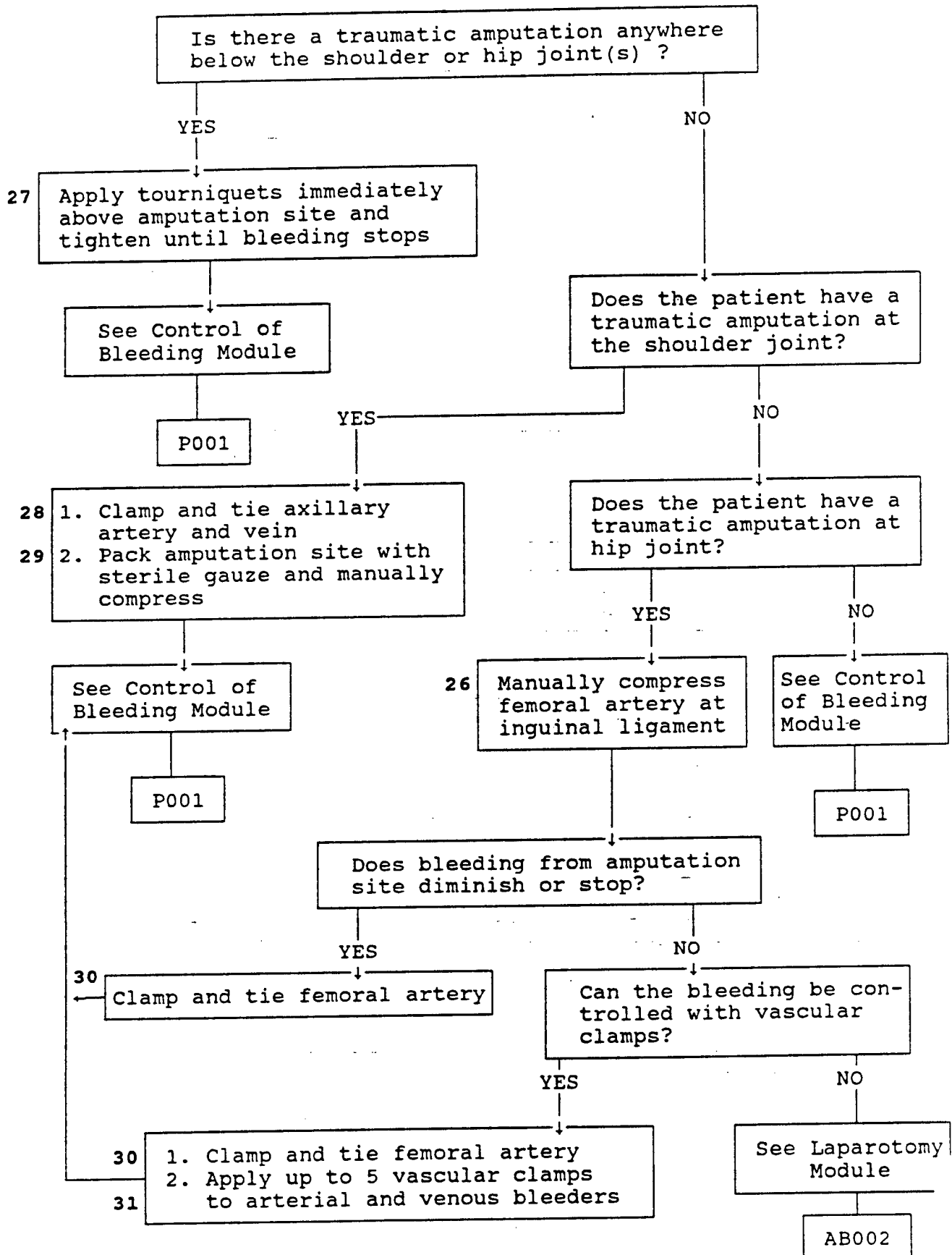


SERIOUS EXTERNAL BLEEDING MODULE

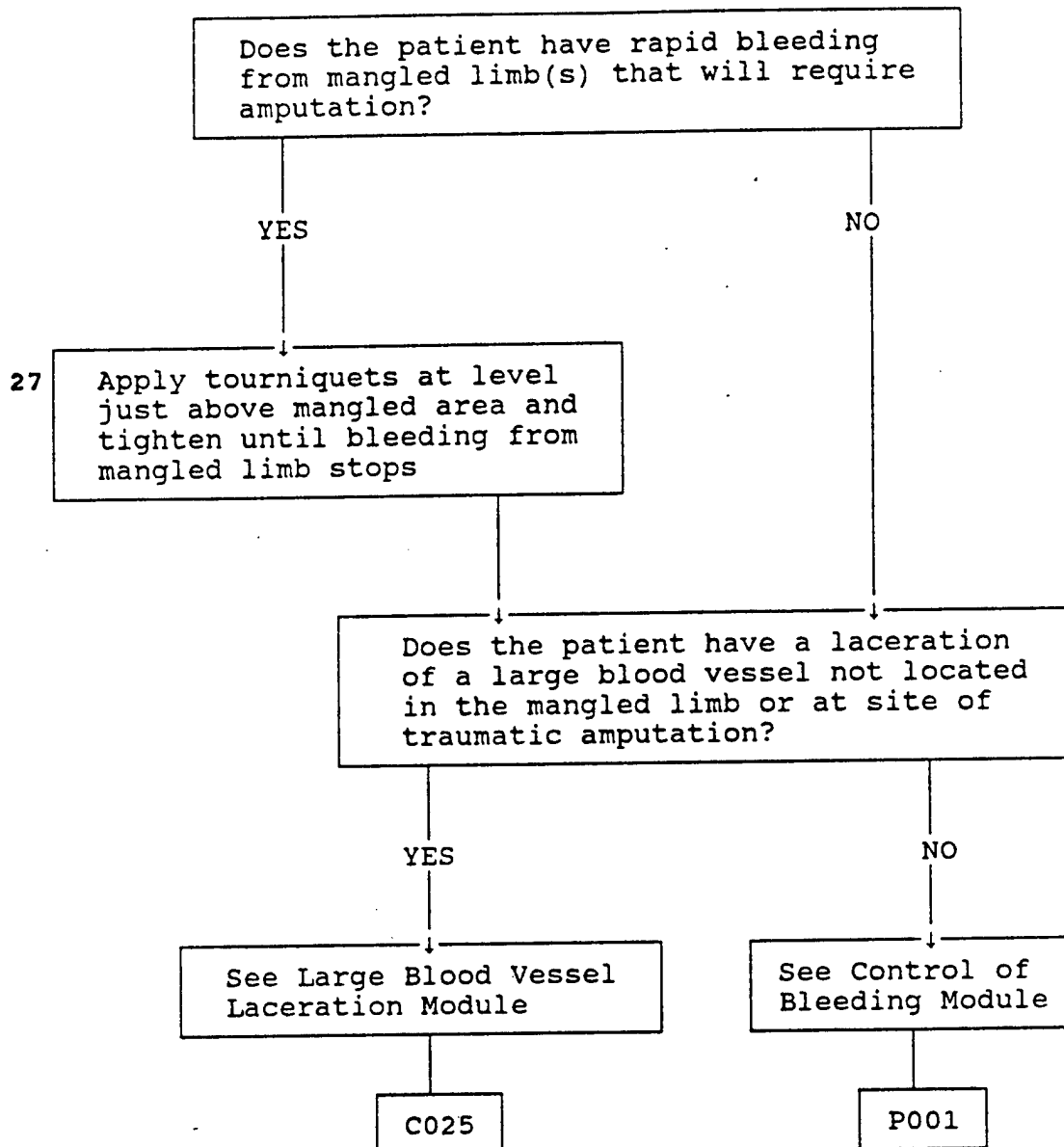


# TRAUMATIC AMPUTATION(S) MODULE

C023  
1/1

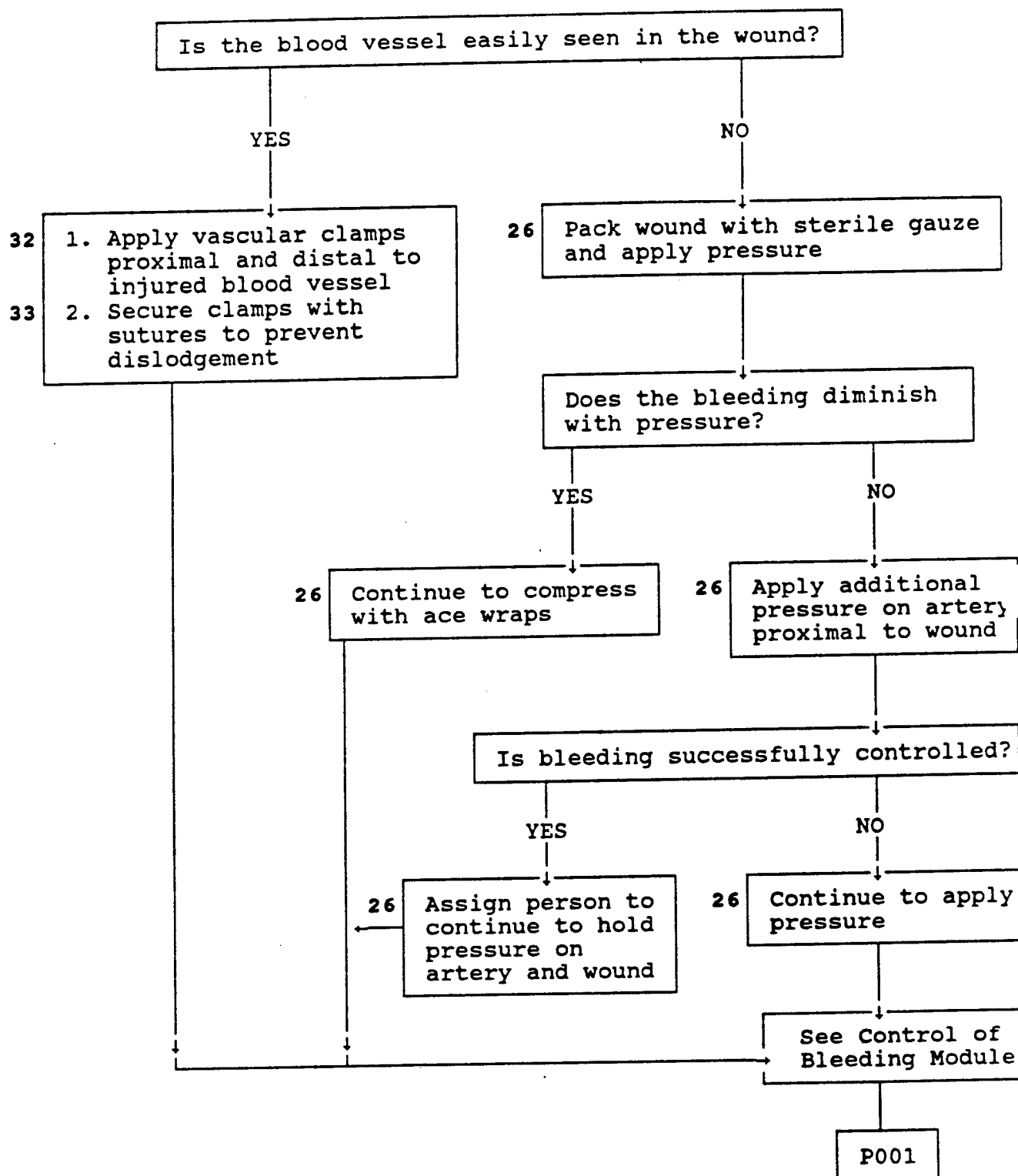


MANGLED LIMB(S) MODULE

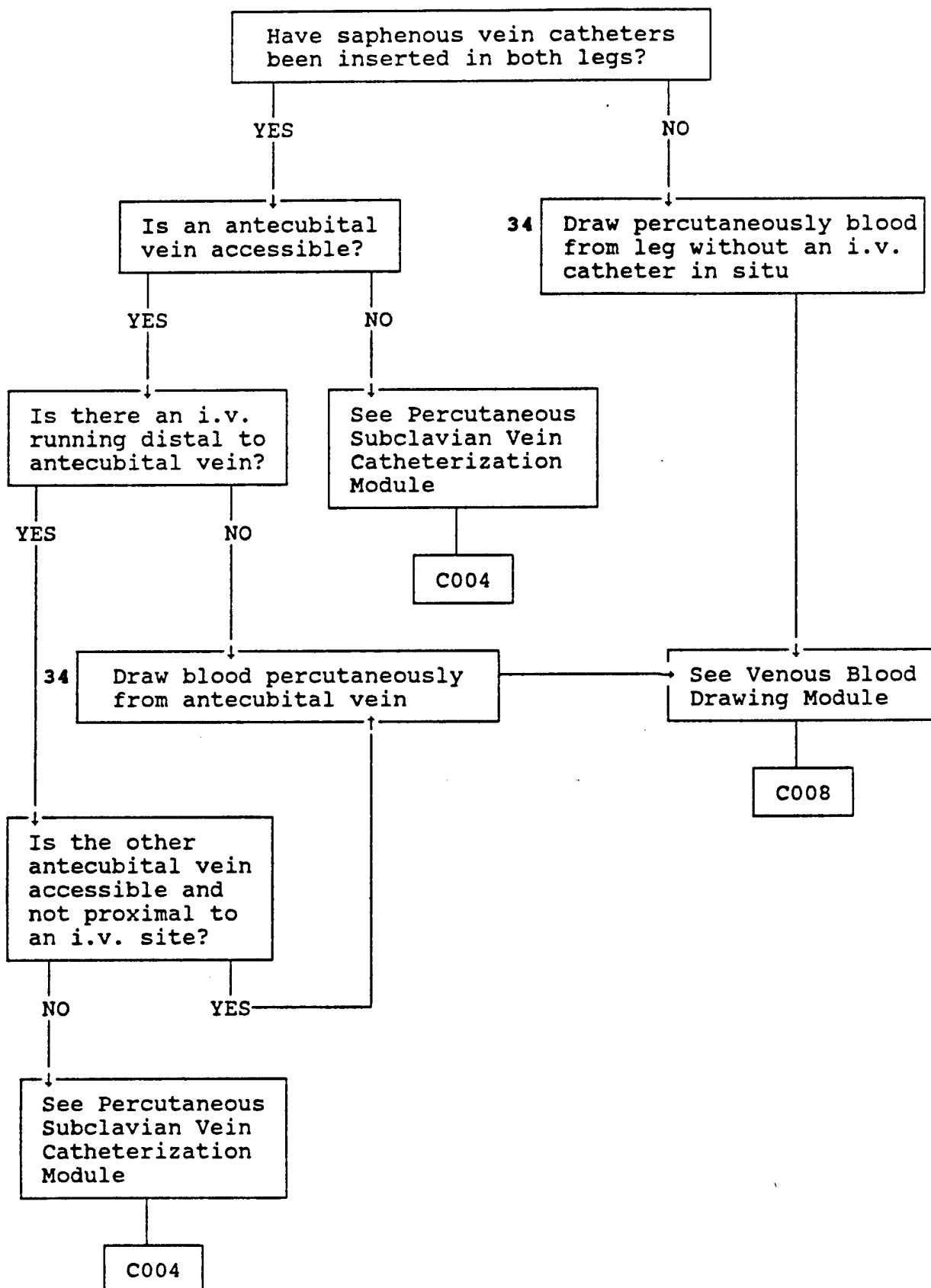




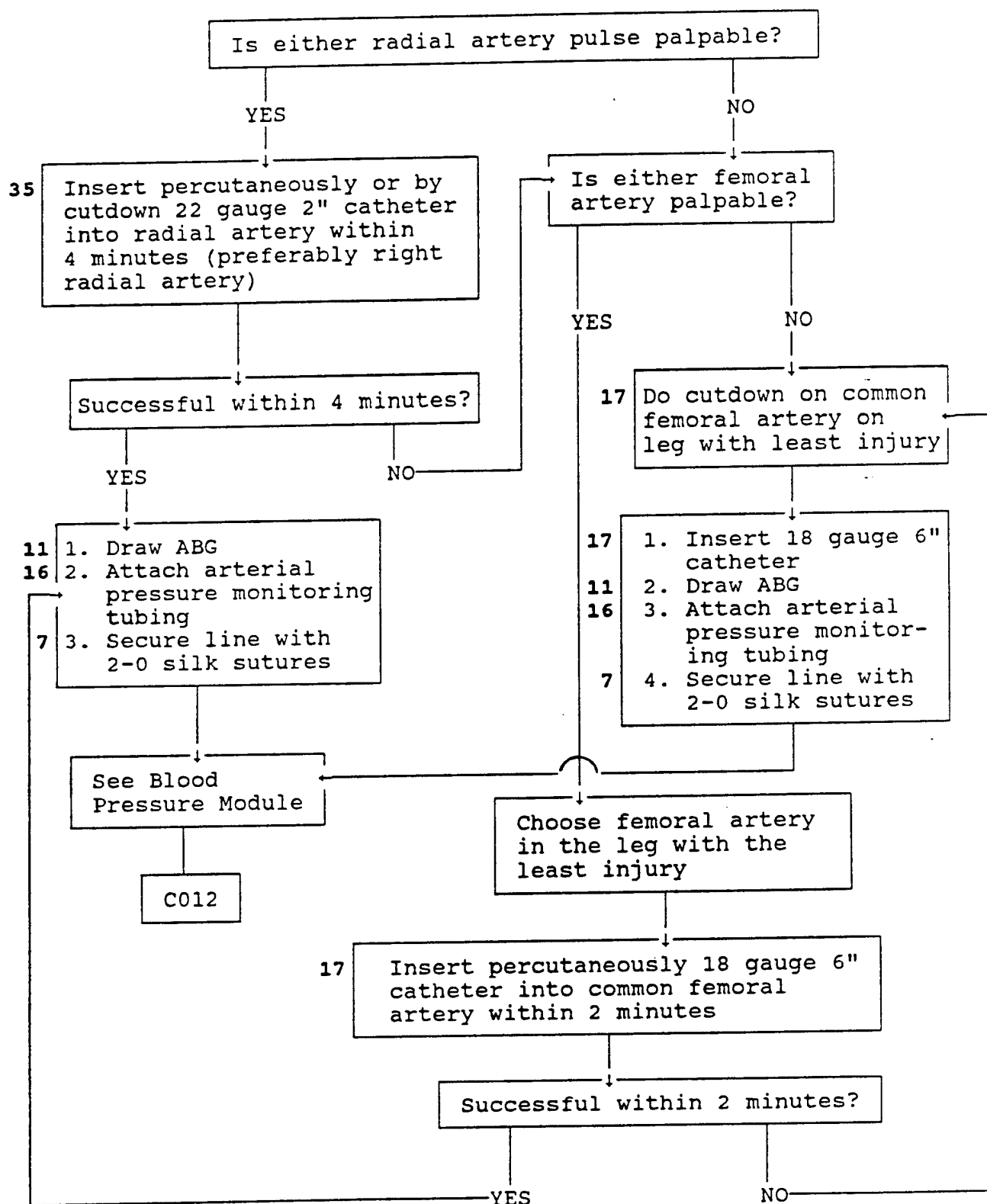
LARGE BLOOD VESSEL LACERATION MODULE



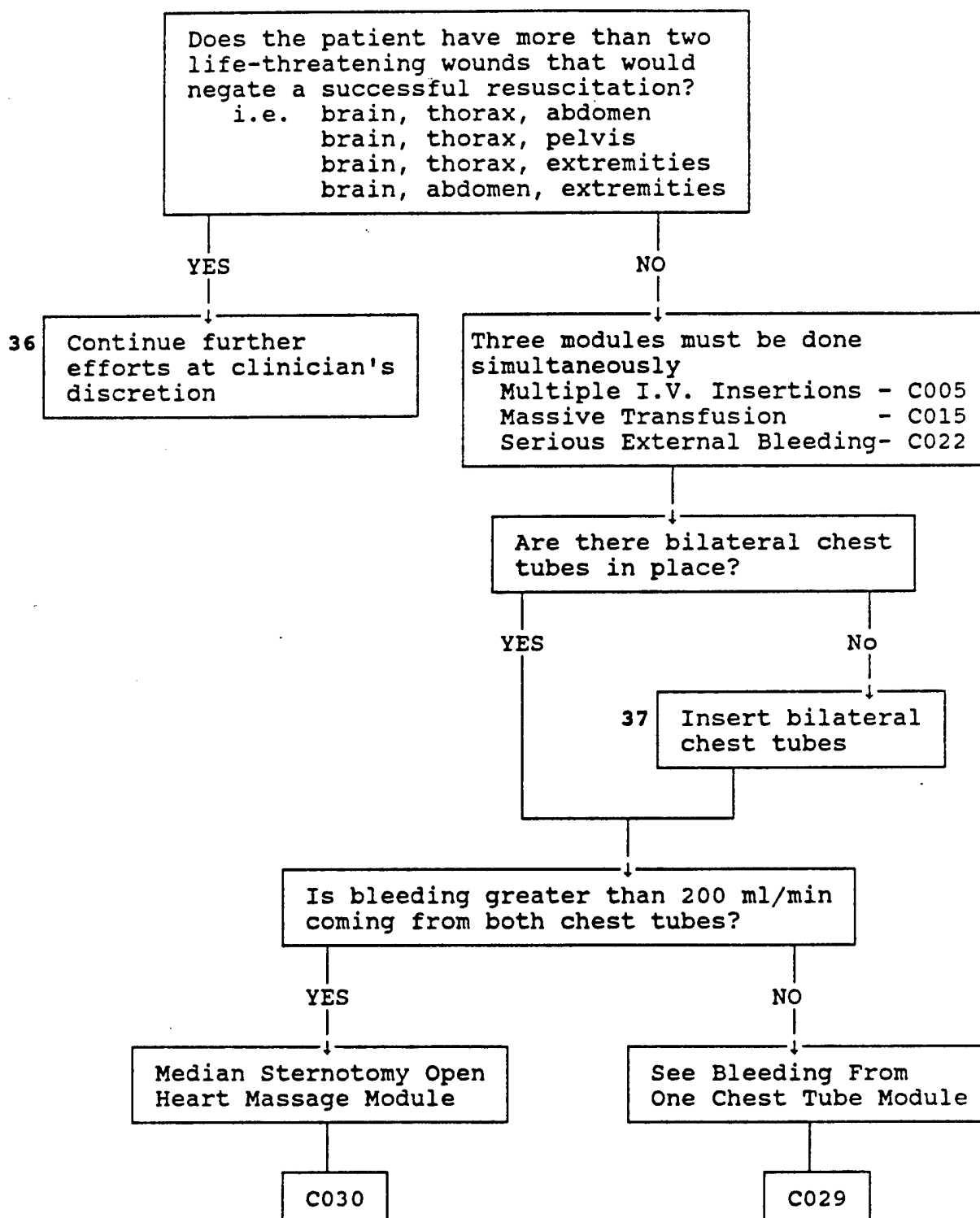
VENOUS BLOOD DRAWING ACCESS MODULE



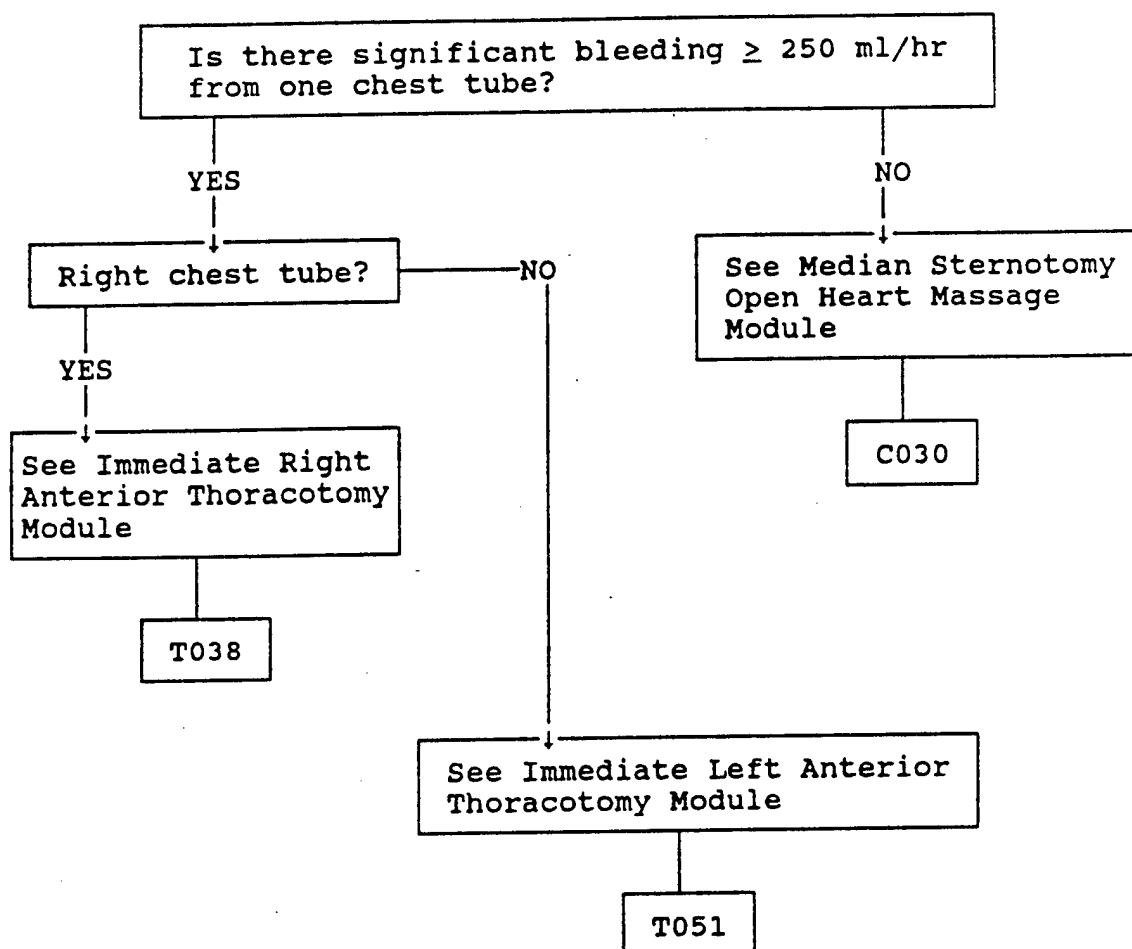
# ARTERIAL CATHETERIZATION MODULE



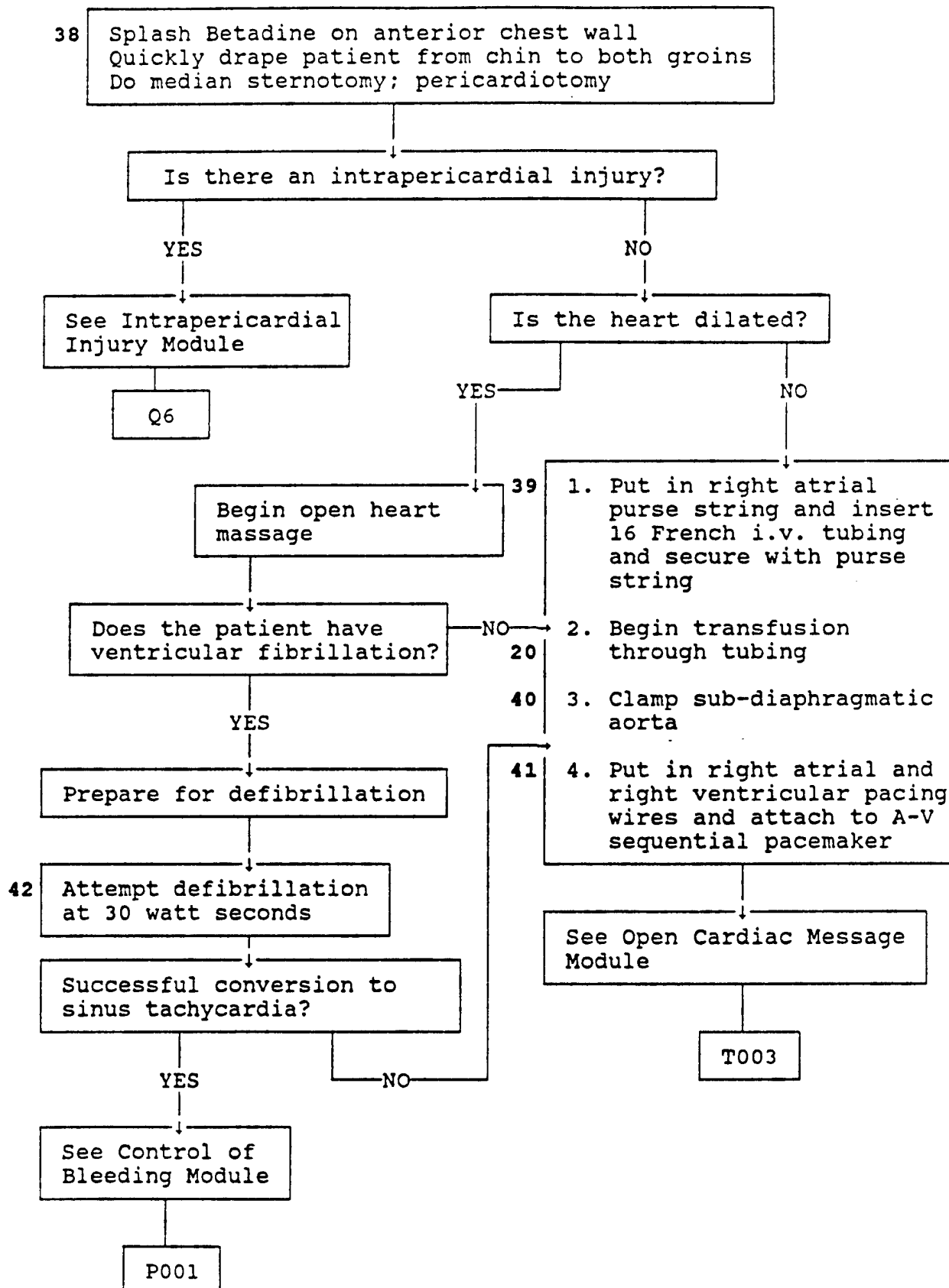
CARDIAC ARREST MODULE



BLEEDING FROM ONE CHEST TUBE MODULE



MEDIAN STERNOTOMY OPEN HEART MESSAGE MODULE



# PENETRATING INJURIES - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Place patient on ventilator	3	3	3	2	1*	Ventilator with tubing; O <sub>2</sub> source; O <sub>2</sub> tubing
2. Check arterial blood gas	3	3	3	2	1*	Laboratory capability; Syringe; Heparin; sponge; ice
3. Adjust FiO <sub>2</sub> to maintain PaO <sub>2</sub> ≥80			3	2	1*	Ventilator with tubing; O <sub>2</sub> source; O <sub>2</sub> tubing
4. Adjust tidal volume/rate to maintain PaCO <sub>2</sub> ≤30, ≥25			3	2	1*	Ventilator with tubing; O <sub>2</sub> source; O <sub>2</sub> tubing
5. Adjust tidal volume/rate to maintain PaCO <sub>2</sub> ≤40, ≥30			3	2	1*	Ventilator with tubing; O <sub>2</sub> source; O <sub>2</sub> tubing
6. Insert orogastric tube	3	3	1*	1*	1*	Orogastric tube; irrigating syringe; normal saline; suction source; tubing; tape
7. Connect tube to intermittent suction			3	3	1*	Orogastric tube; irrigating syringe; normal saline; suction source; tubing; tape
8. Insert orogastric tube with laryngoscopy if necessary	3	3	1	1	1*	Laryngoscope; orogastric tube; irrigating syringe; normal saline; suction source; tubing; tape
9. Lubricate nasogastric tube			3	3	1*	NG tube; lubricant
10. Insert tube into nostril	3	3	1*	1*	1*	NG tube; irrigating syringe; lubricant; normal saline; suction source; tubing; tape
11. Instill 50 cc air into gastric tube				3	1*	Irrigating syringe
12. Attempt passage via mouth. Laryngoscope may be required	3	3	1*	1*	1*	Laryngoscope; orogastric tube; irrigating syringe; normal saline; suction source; tubing; tape
13. Sterile prep of chest tube - chest drainage system			3	3	1*	Betadine solution; chest drainage system; tubing suction source
14. Pass Fogarty balloon or Foley balloon catheters, or naso-tracheal suction catheter	3	3	1*	1*	1*	Fogarty balloon catheter; Foley balloon; nasotracheal suction catheter; sterile connection

\*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*  
In most cases the specialty surgeon is a thoracic surgeon. However point 20 could be accomplished by an ear/nose throat specialist. Also points 21, 30, 31, and 32 would require a radiology team, and point 34, an orthopedic or vascular surgeon to be optimal.  
In general number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.  
Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

15. Suture skin around chest tube tightly	3	3				2-0 silk; needle holder
16. Cover skin/tube interface with vaseline gauze			3	3	1*	Vaseline gauze
17. Pass large channel bronchoscope	3	3				Bronchoscope; bronchoscope machine; suction; lubricant; ET tube
18. Pass small channel scope or switch endotracheal tube	3	3				Bronchoscope; bronchoscope machine; suture; lubricant; small channel scope; ET tube
19. Pass ET tube below injury using bronchoscope for guidance	3	3				Bronchoscope; bronchoscope machine; suture; lubricant; small channel scope; ET tube
19a. Suction blood and mucus and irrigate with saline mucomyst until clear	3	3				Suction capability; saline; mucomyst
20. Cervical approach to tracheal repair	3	3				Thoracic tray
21. Obtain stat chest X-ray			Radiology Team			X-ray machine; plate; light source; stethoscope
22. Pull back the tube an appropriate distance to allow endotracheal tube tip to lie 1" above carina	3	3				AMBU bag; syringe
23. Secure the endotracheal tube	3	3	1*	1*	1*	Tape; Benzoin ointment
24. Manipulate gastric tube until its tip lies within the stomach	3	3				NG tube; syringe
25. Do needle thoracostomy on side of tension pneumothorax	3	3	1*	1*	1*	#10, 12, 14 angiocath; 1 1/2 finger glove with rubber band tape; Heimlich valve (flutter valve with stopcock)
26. Insert chest tube on side of pneumothorax	3	3				Scalpel; chest tube (male #36, female #32, child #28); scissors; clamp (curved) 0-silk (Keith) needle holder; prep solution; zyllocaine with syringe; 4 x 4's tape; suction set-up; suction tubing
27. Subpectoral Chest Tube Insertion Module	3	3				Scalpel; chest tube (male #36, female #32, child #28); scissors; clamp (curved) 0-silk (Keith) needle holder and sutures; prep solution; zyllocaine with syringe; 4 x 4's tape; suction set-up; suction tubing; vaseline and sterile gauze dressings
28. Do thoracotomy and lobectomy	3	3				Thoracotomy list; chest sets (thoracic and vascular)
29. Measure systolic blood pressure	3	3	3	2	1	Blood pressure cuff; stethoscope
30. Get CAT scan of brain			Radiology Team			CT capability; contrast material; syringe;



31. Get CAT scan of face		Radiology Team	CT capability; contrast material; syringe;
32. CAT scan with contrast of abdomen and pelvis		Radiology Team	CT capability; contrast material; syringe;
33. Review patient's status; oxygenation; perfusion; metabolic status; antibiotic/tetanus	3	3	
34. Amputate limb	3	3	Large clamps; tourniquet; retractors; dressings; suction device; extremity amputation list
35. Repair injured extremity	3	3	Orthopedic and Vascular trays

AMPUTATION - EXTREMITY EQUIPMENT LIST

SUTURE

-----  
VICRYL 0 STRAND  
VICRYL 2-0 STRAND  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
ETHILON 3-0 CUTTING

SUPPLIES

-----  
DRAPE, SPLIT SHEET  
DRAPE, MEDIUM 44 X 60"  
MAYO STAND COVER  
TOWELS, STERILE (6)  
GLOVES, SURGEON ASSORT. SIZES  
GOWN, SURGICAL XTR. LRG.  
BASIN SET W/ GRADUATE & MED.CUP.  
SPONGE, LAP 18 X 18 (2)  
PAD, GROUNDING  
CAUTERY, HANDSWITCH  
SUCTION TUBING 20'  
IRRIG. WATER 1500 CC  
IRRIG. NACL 1000 CC  
BLADE, SURGICAL #10 (2)

INSTRUMENTS & EQUIPMENT

-----  
AMPUTATION SET  
ORTHOPEDIC SET  
BLADE, GIGLI  
CAUTERY, MACHINE

DRESSING

-----  
XEROFOAM 5 X 9"  
GAUZE 4 X 9" 12 PLY  
ABD, LARGE  
ELASTIC 4" X 5'  
ELASTIC 6" X 5'

AMPUTATION SET EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

1 AMPUTATION SAW  
1 LEWEN BONE HOLDER  
3 GIGLI SAW HANDLES  
2 DEEP RAKES  
1 STAINLESS STEEL RASP  
1 STAINLESS STEEL FILE  
1 LANGENBECK PERI ELEVATOR

PEEL PACK:  
-----

1 AMPUTATION KNIFE

ON STRINGER:  
-----

6 CURVED CRILES

CHEST SET (THORACIC) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAPFORD CHEST SCISSOR  
EX LONG N.E.  
EX LONG FINE N.E.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
MEDIUM NEEDLE HOLDERS  
LONG NEEDLE HOLDER -NOT FINE  
SPONGE STICKS  
LONG CURVES  
LAUERS  
TONSILS  
ROCKERS - CLAMP  
BABCOCK CLAMP  
ALLIS CLAMP  
CURVED CRILER  
CURVED MOSQUITOES CLAMP  
SUTURE SCISSORS  
MAYO SCISSORS  
METZ SCISSORS  
LONG METZ SCISSORS

CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
TONSILS  
MEEKER  
KIDNEY PEDICAL CLAMP  
REGULAR RUMELS  
REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR  
PEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES  
#3 LONG KNIFE HANDLE

ORTHOPEDIC SET EQUIPMENT LIST

-----  
CONTENTS  
-----

ON STRINGER:  
-----

2 SHORT N.H.  
2 MEDIUM N.H.  
1 LEWEN BONE CLAMP  
1 LONG CURVE  
1 LAUER  
4 OCHNERS  
2 GYNE ALLISES  
2 REGULAR CURVES  
4 CURVED CRILES  
2 CURVED KELLIES  
1 SUTURE SCISSOR  
1 BANDAGE SCISSOR  
1 MAYO SCISSOR  
1 METZ SCISSOR  
6 REGULAR TOWEL CLIPS

BOTTOM OF PAN:  
-----

2 ARMY/NAVYS  
2 SHARP RAYES  
2 WIDE HIBBS  
2 NARROW HIBBS  
2 LARGE TAYLOR  
1 SMALL TAYLOR  
2 BENNETTS  
1 ADSON RONGEUR  
2 MEDIUM WEITLANERS  
1 LANGENBECK  
1 PLIER  
1 MAILLET  
1 POINTED RONGEUR  
1 SMALL PIN CUTTER  
6 BALL CLIPS

PEEL PACK:  
-----

2 #3 KNIFE HANDLES  
1 #4 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
1 TONSIL SUCTION  
1 #12 FRAZIER SUCTION  
1 LONG THUMB W/TEETH  
2 FINE GYNES  
2 MEDIUM RUSSIANS  
2 ADSONS W/TEETH

PEEL PACK:  
-----

1 1/4" DRILL BIT  
1 7/64" DRILL BIT  
1 SMALL METAL RULER

# THORACOTOMY LIST

## SUTURE

-----  
 SILK A-305H 0 STRAND  
 SILK BA-75H 2-0 STRAND  
 SILK BA-74H 3-0 STRAND

## STICK TIPS

-----  
 SILK K-33H 2-0  
 VICRYL J-833H 2-0 SH  
 SILK K-832H 3-0  
 CHROMIC G-122H 3-0 SH

## BRONCHUS

-----  
 VICRYL J-304H 4-0 BR-1 (new with  
 2-0 silk strand for chest  
 tube skin stitch)  
 NEEDLE 3/8 CUTTING 2090-14

## OR

-----  
 SILK 7370 2-0 X-0

## CLOSURE

-----  
 VICRYL J-8490 2 TP-1  
 MAXON 2-0 T-25 OR 628751  
 MAXON 3-0 T-25 6287-41

## SKIN (ANK)

-----  
 PDS 2-422H 4-0 FR-2  
 STAPLE, LOADING UNIT SM-35W  
 STAPLE GUN, SKIN

## PACKS AND DRAPES

-----  
 PACK, BASIC  
 BASIN, MAJOR  
 BASIN, STANDARD SINGLE SET  
 TRAY, SKIN SCRUB SURGERY  
 COVER, MAYO STAND 8337  
 SHEET, TRANSVERSE LAP  
 GOWN, STER BACK XL A9541  
 GOWN, STER BACK LAG A9511  
 CLOTH DRAPE (SINGLE)  
 TOWELS, STERILE (8 PK)

## FOLBY CATHETERS --ASK FIRST

-----  
 TRAY, CATH FOLBY UNIVERSAL  
 CATHETER, FOLBY W/T SENS 16FR3C  
 URINETER, DRAIN BAG

## CAUTERY

-----  
 CAUTERY MACHINE  
 PAD, GROUNDING ADULT  
 PENCIL, ELECTROSWITCH HANDSWITCH  
 BOVIE HOLDER  
 ELECTRODE, BLADE EXTENDED (ARGON  
 BEAM MACHINE AVAILABLE)  
 ARGON BEAM PAD  
 ARGON BEAM TIP

## SPONGES

-----  
 SPONGES, CYLINDRICAL DISSECTORS  
 SPONGE, LAP 12 X 12  
 SPONGE, LAP 18 X 18  
 SPONGE, GAUZE X-RAY DETECT

## SUCTION

-----  
 RECEPTAL LINER 3000CC  
 TUBE, CONNECTING 20 FT

## SOLUTIONS

-----  
 SOLUTION, IRRIG WATER 1500ML  
 SOLUTION, IRRIG NACL 1000

## MISCELLANEOUS SUPPLIES

-----  
 BLADE, SURGICAL #21  
 BLADE SURGICAL #10 024760  
 BLADE, SURGICAL #15  
 BONE WAX W-310  
 DACRON TAPE 8618-00  
 DRAPE, IORAN 6648  
 HEMOCLIP, MED  
 HEMOCLIP, LRG  
 MAGNETIC INSTRUMENT MAT  
 MAGNETIC NEEDLE MAT AVAILABLE  
 RAZOR, PREP DISP  
 VESSEL LOOPS MAXI RED  
 VESSEL LOOPS MINI YELLOW

## DRAINS

-----  
 TUBE, CHEST 28FR THORACIC  
 TUBE, CHEST 32FR THORACIC  
 TUBE, CHEST 36FR THORACIC  
 PLEUREVAC, ADULT

## INSTRUMENTS AND EQUIPMENT

-----  
 CHEST SET  
 LAPAROTOMY SET  
 LUNG SPATULA  
 BEANBAG/"U" SHAPED VAC PAC  
 CARDIO VASCULAR TRAY  
 HEADLIGHT  
 LIGHT HANDLES, BLUE RIGID (2)  
 CRYO UNIT  
 SCISSOR, METZ, LONG FINE  
 APPLIER, HEMOCLIP, LARGE, LONG

## (HAVE AVAILABLE)

FCP, ATRAGRIP, LONG  
 CLAMP, COARCTATION  
 N R, EX. LONG  
 RETR, MOORER, STERNAL  
 RETR, HINGELSTRIN  
 CLAMP, THORACIC ANEURYSM  
 DRESSINGS

-----  
 DRESSING, TRIFA  
 DRESSING, GAUZE 4 X 8 12 PLY  
 PAPER TAPE

TRAUMA CHEST TRAY - Minimal equipment

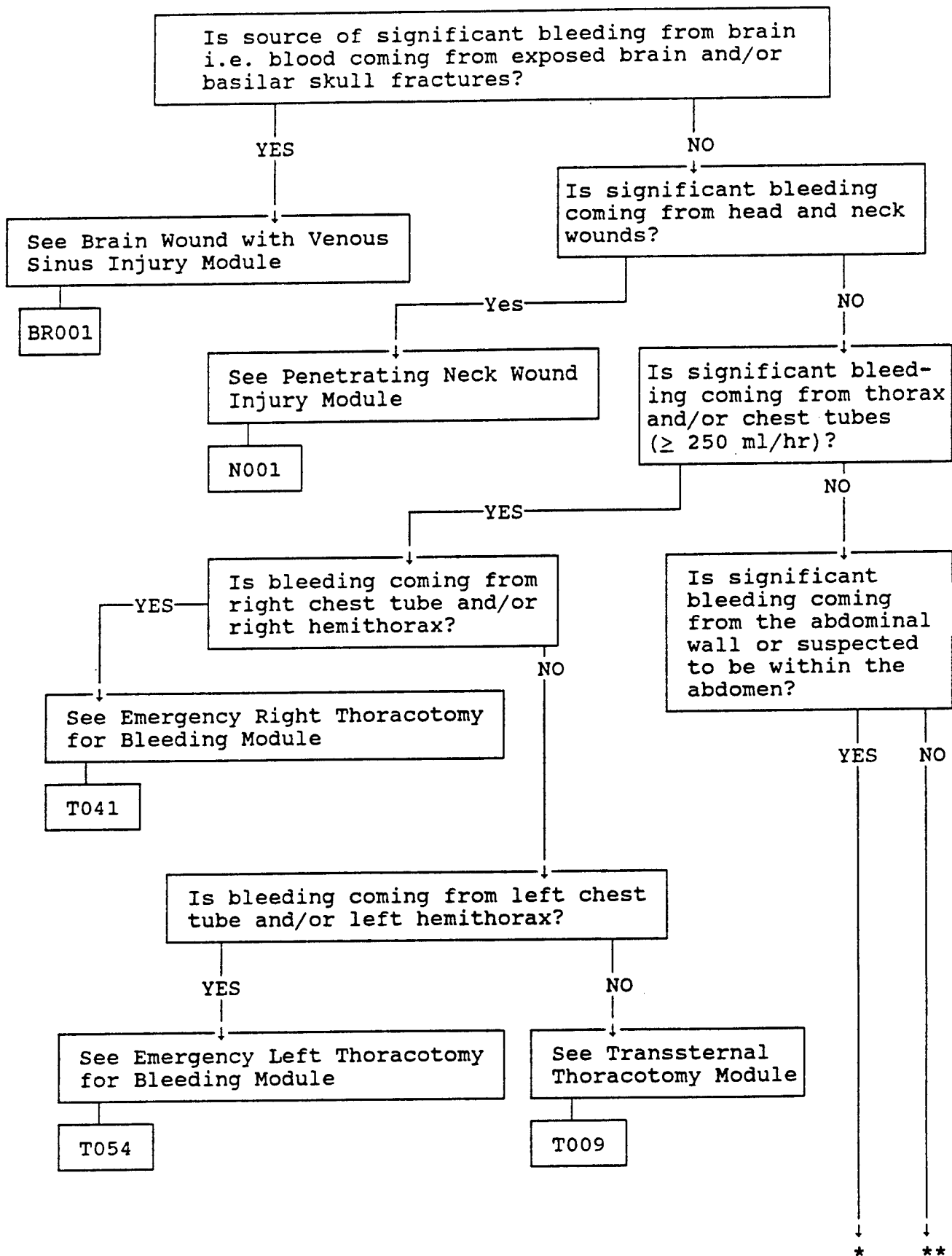
-----

- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
  - STERNAL SAW/LEBSCHKE
  - BETADINE PREP
  - SUTURE FOR REPAIR
  - SUCTION
  - CHEST TUBES
  - DRAINAGE SYSTEM



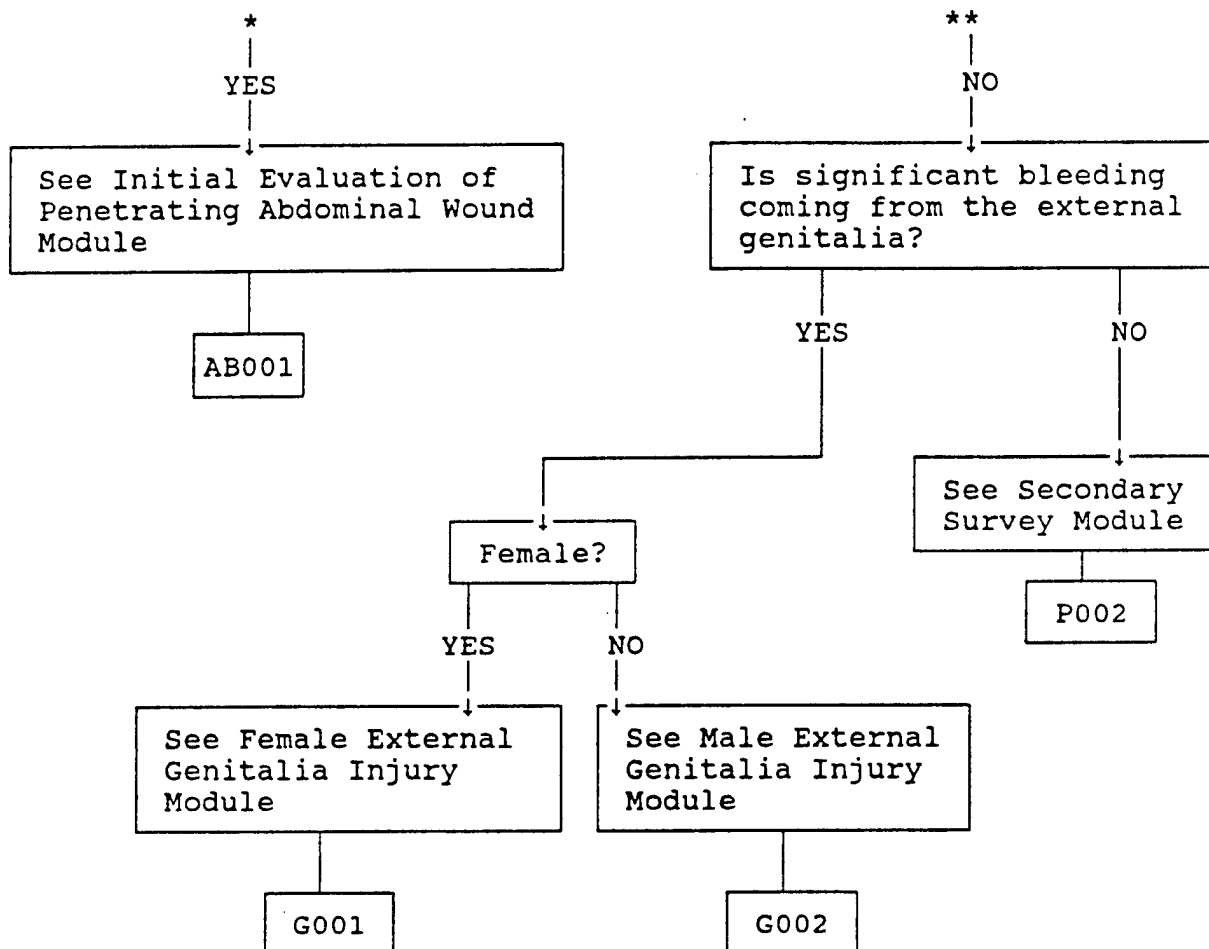
CONTROL OF BLEEDING MODULE

P001  
1/2

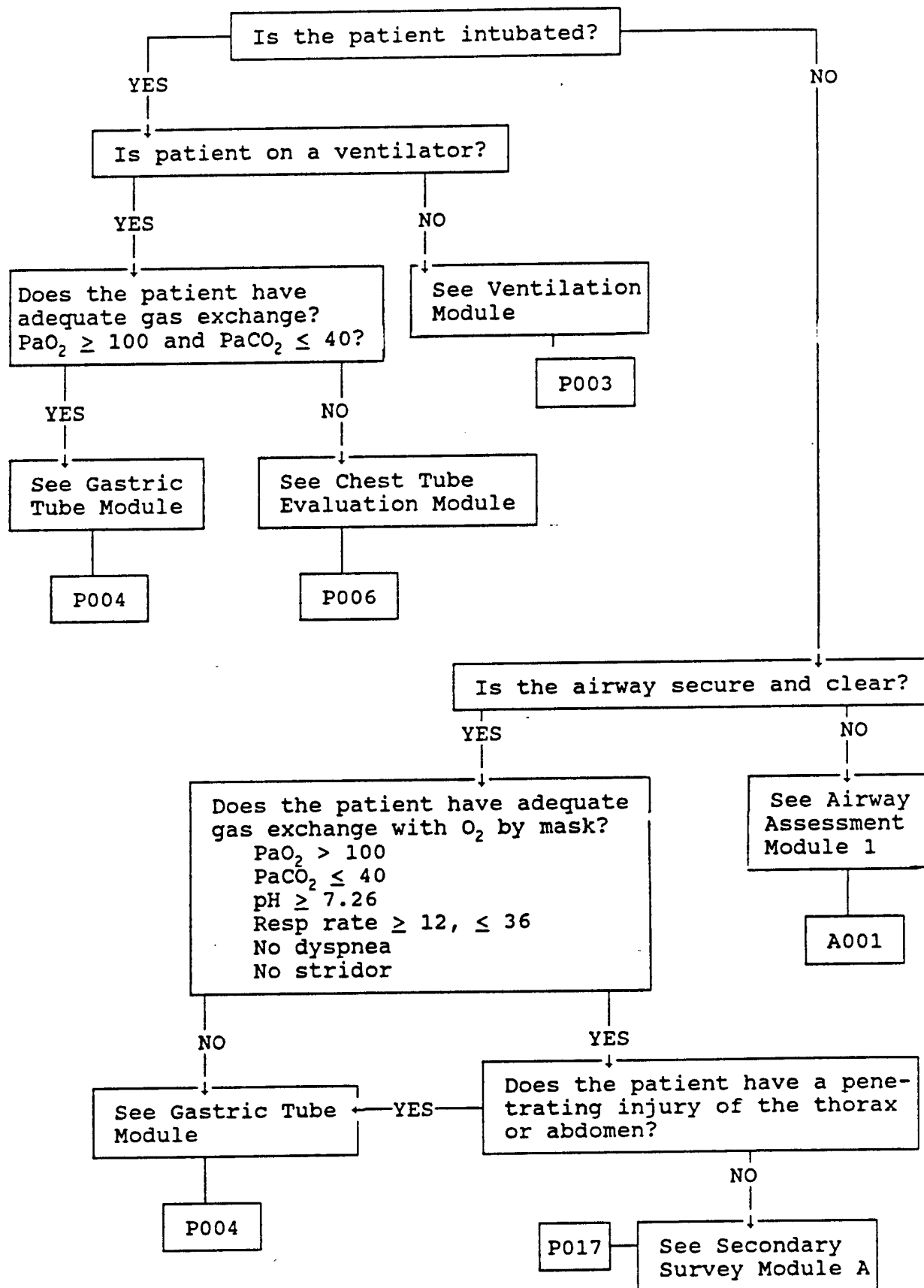


CONTROL OF BLEEDING MODULE

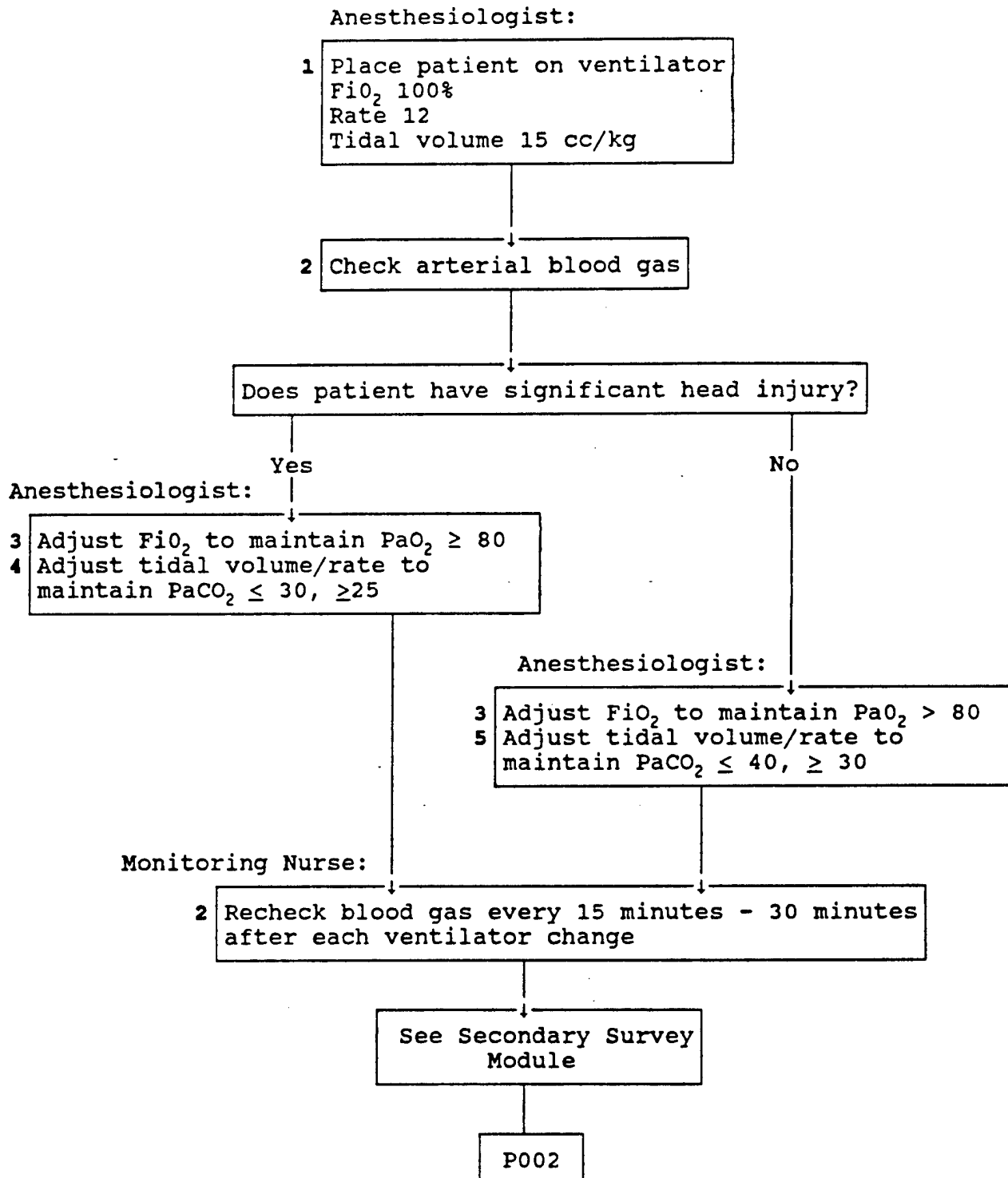
P001  
2/2



SECONDARY SURVEY MODULE

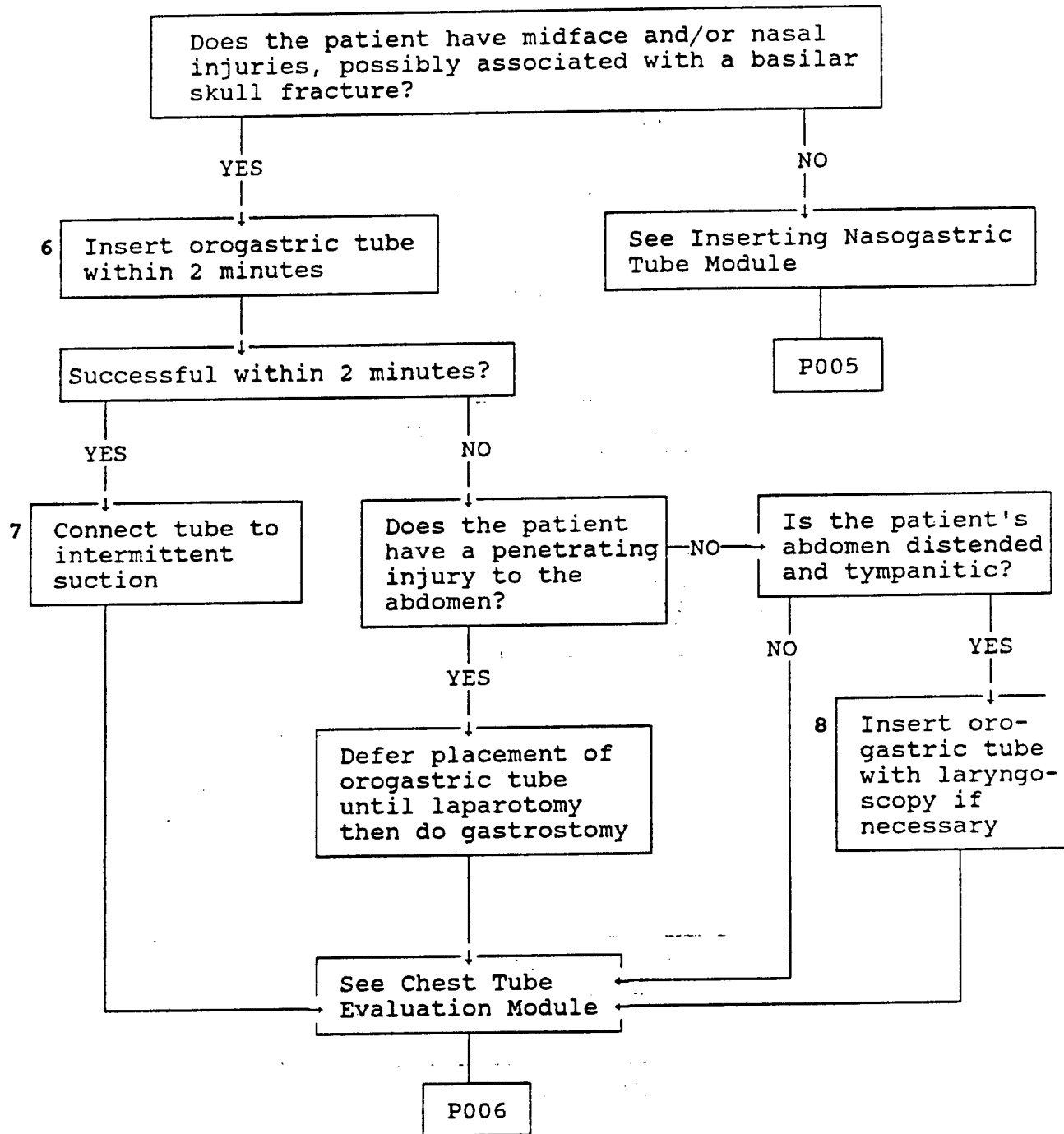


VENTILATION MODULE



GASTRIC TUBE MODULE

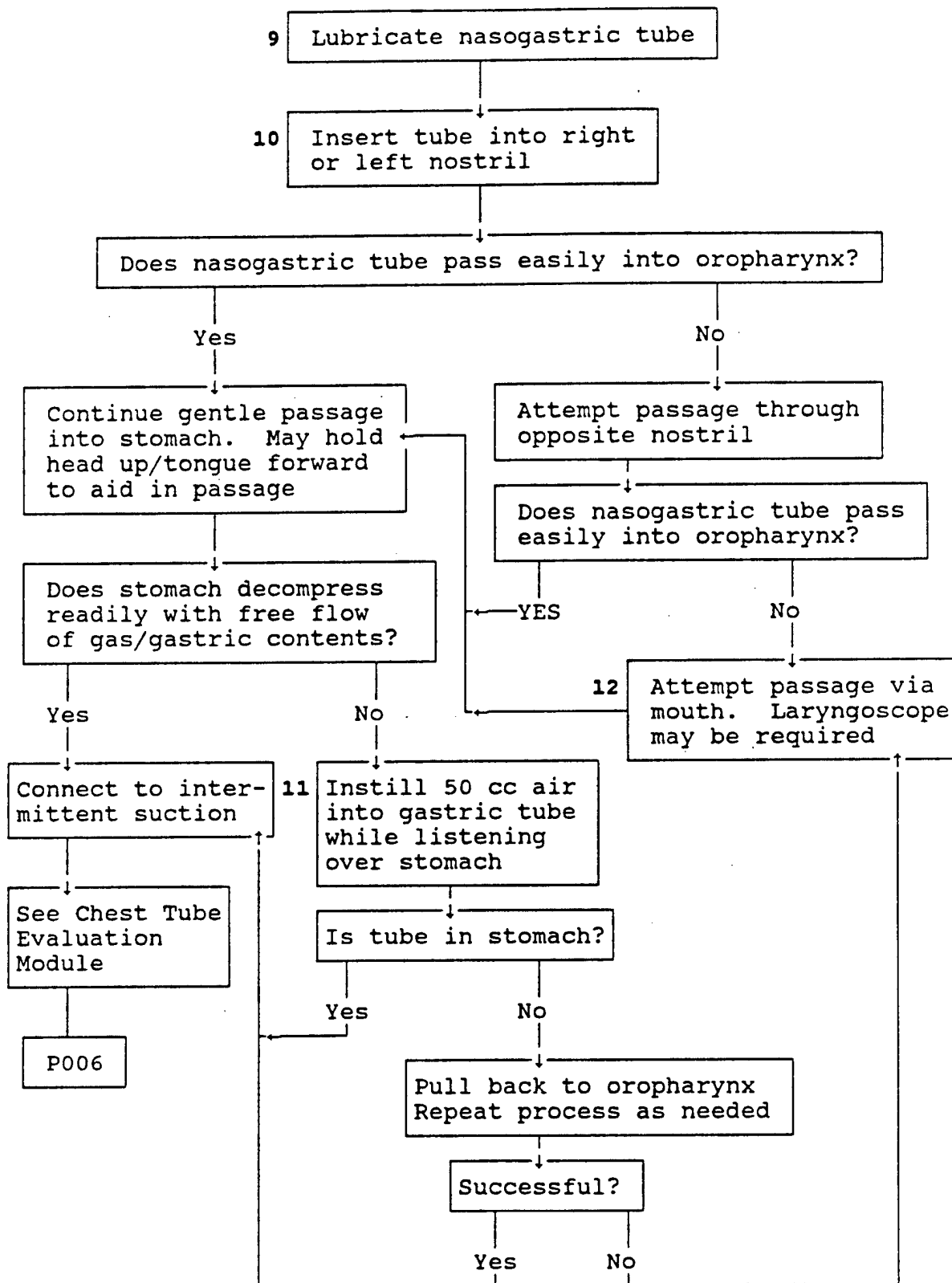
P004  
1/1



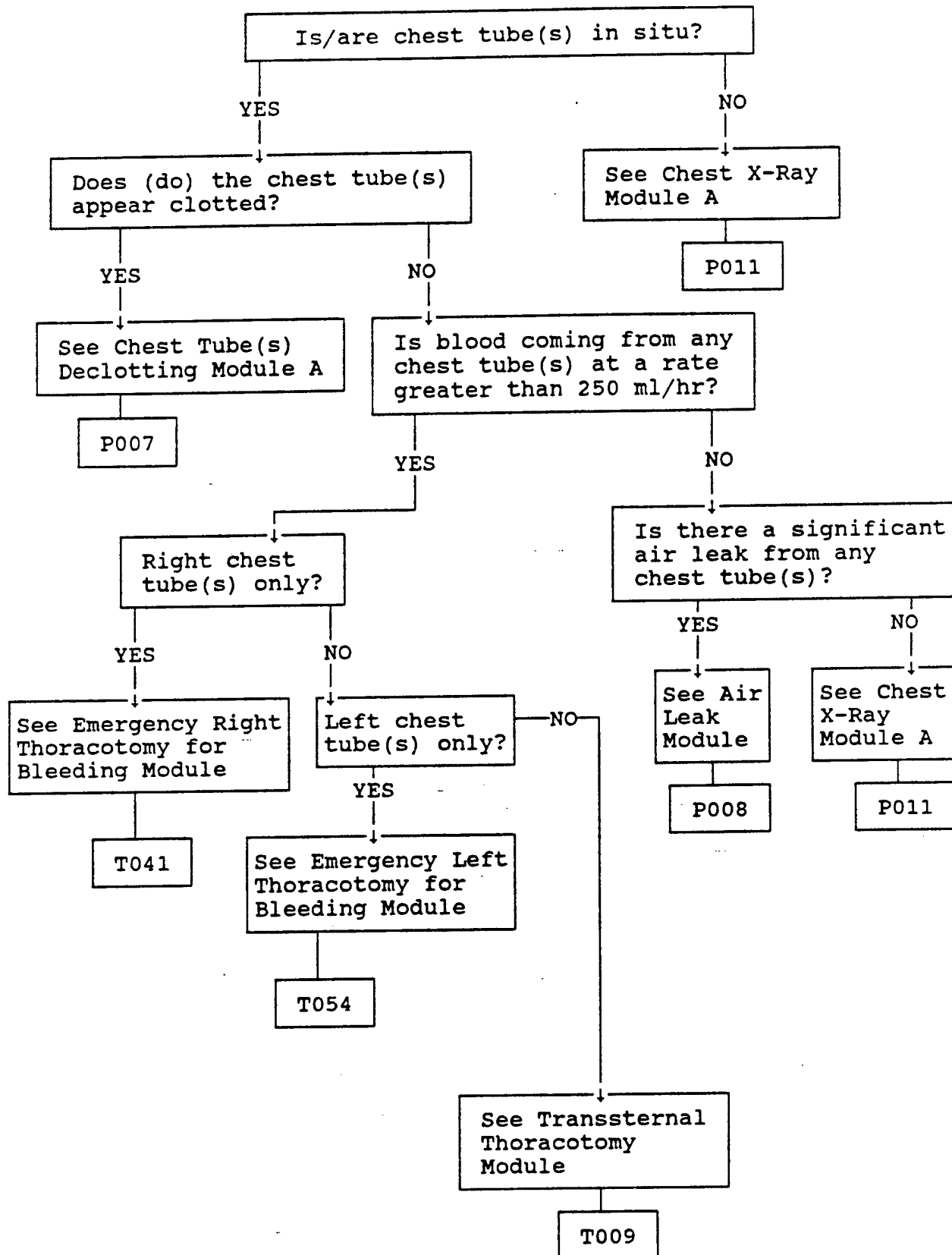
INSERTING NASOGASTRIC TUBE MODULE

P005

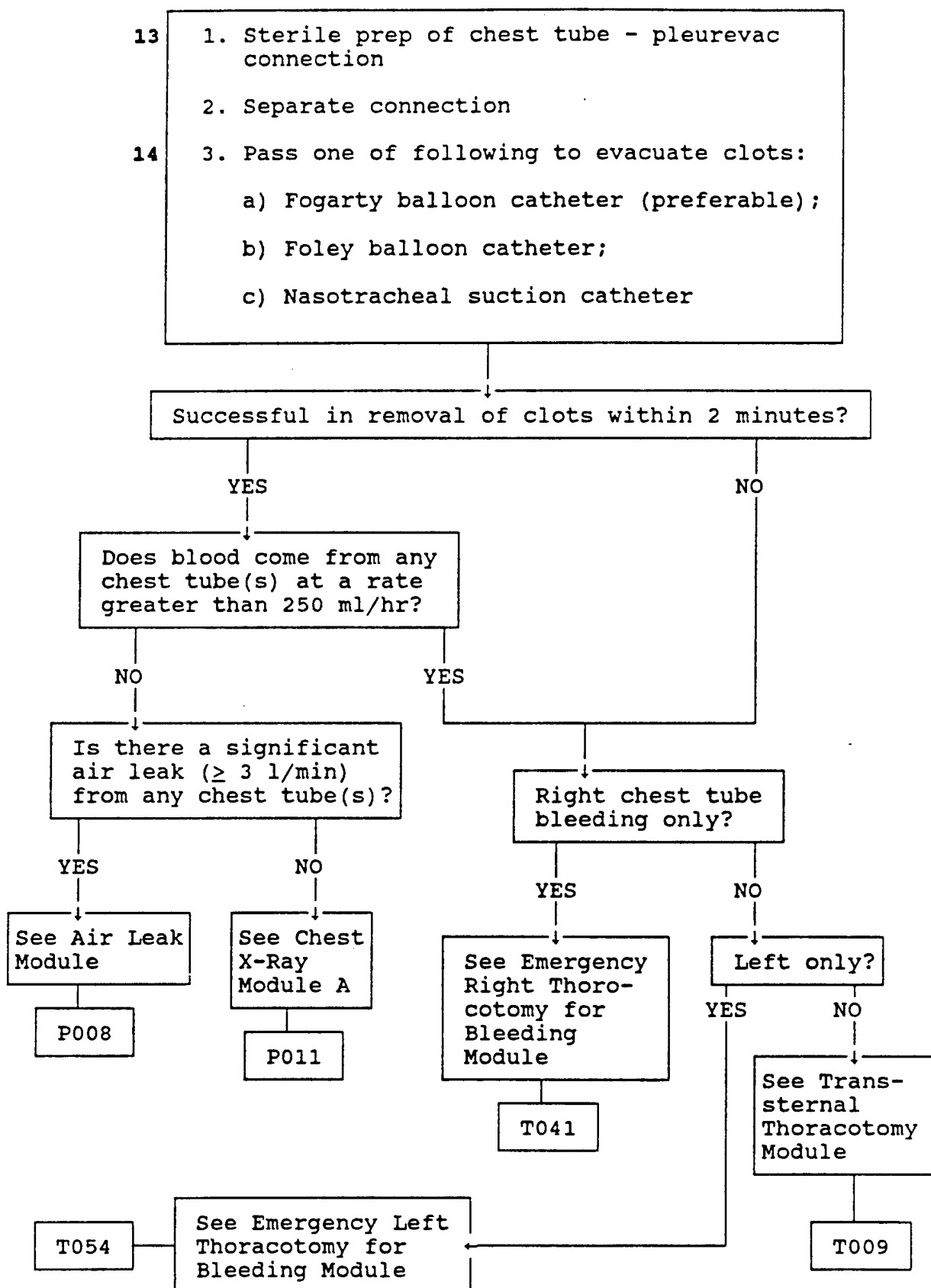
1/1



CHEST TUBE EVALUATION MODULE



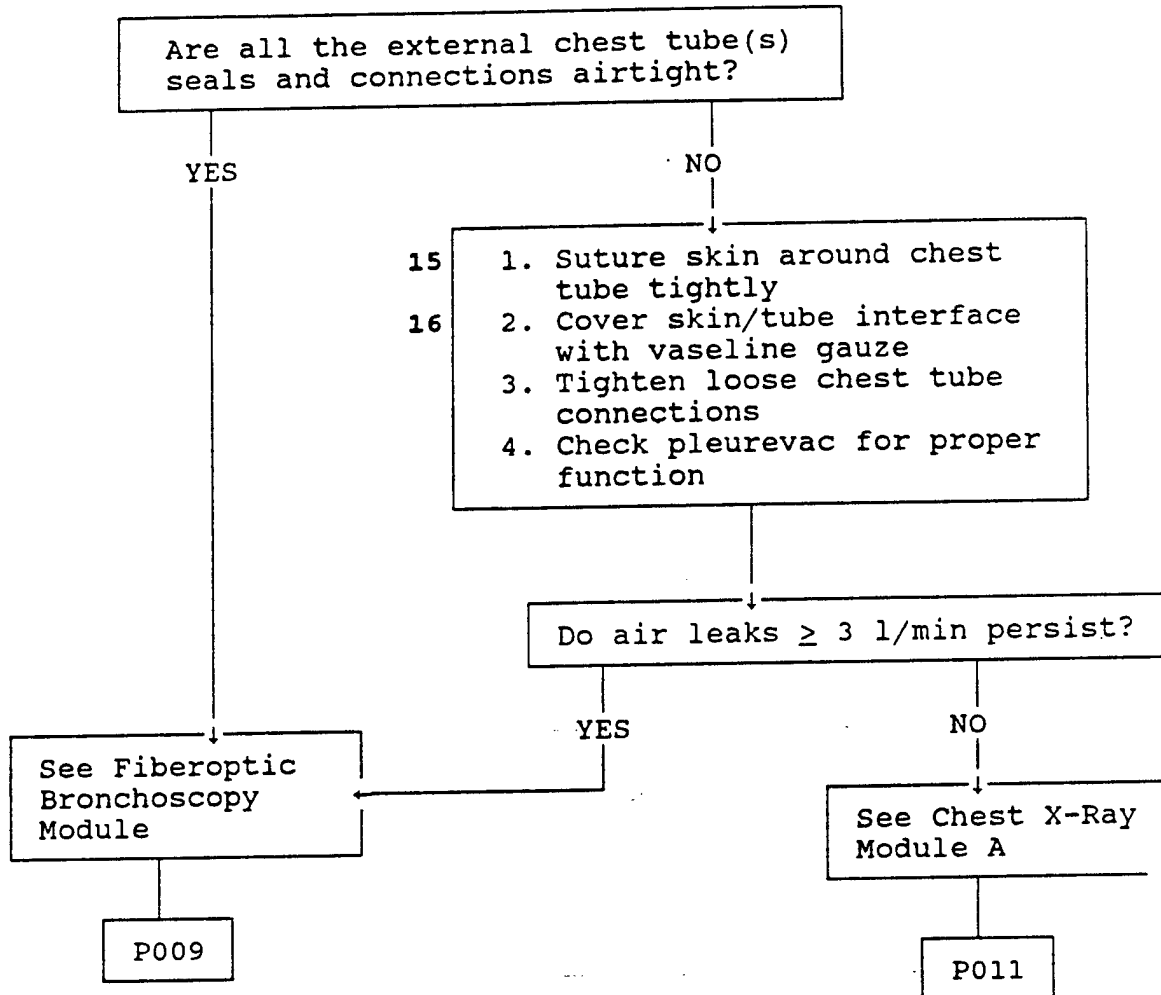
CHEST TUBE DECLOTTING MODULE A





AIR LEAK MODULE

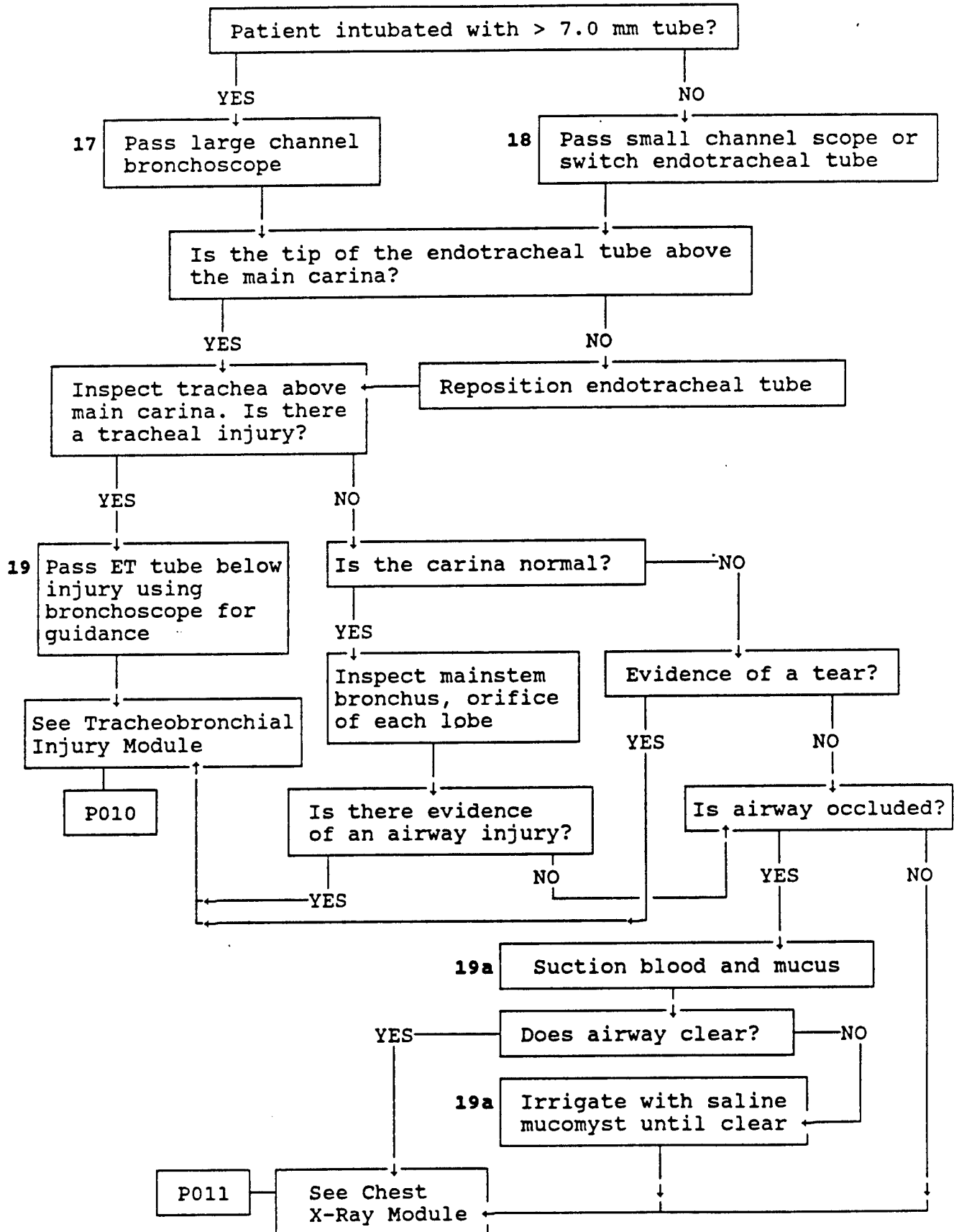
P008  
1/1



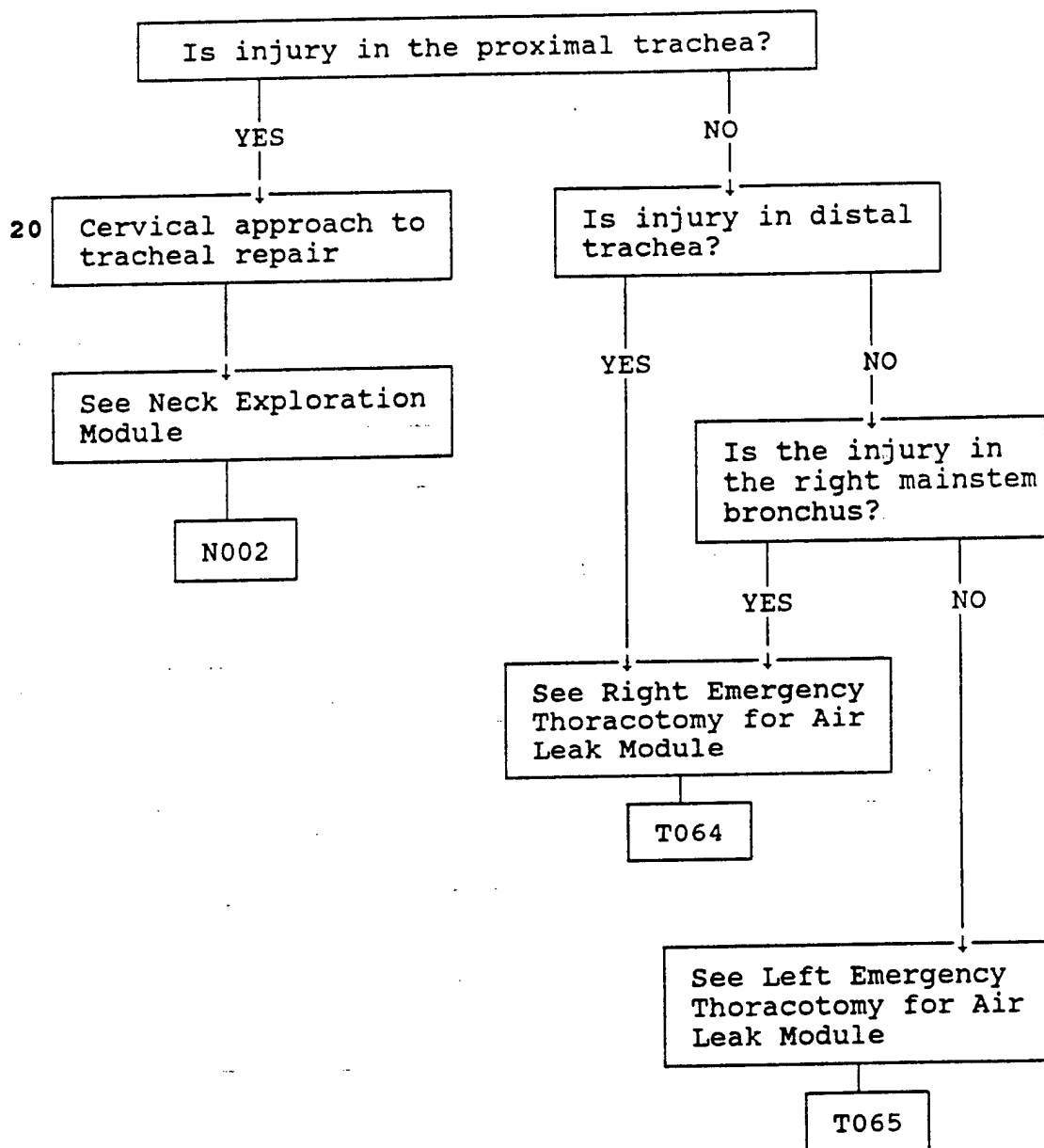
FIBEROPTIC BRONCHOSCOPY MODULE

P009

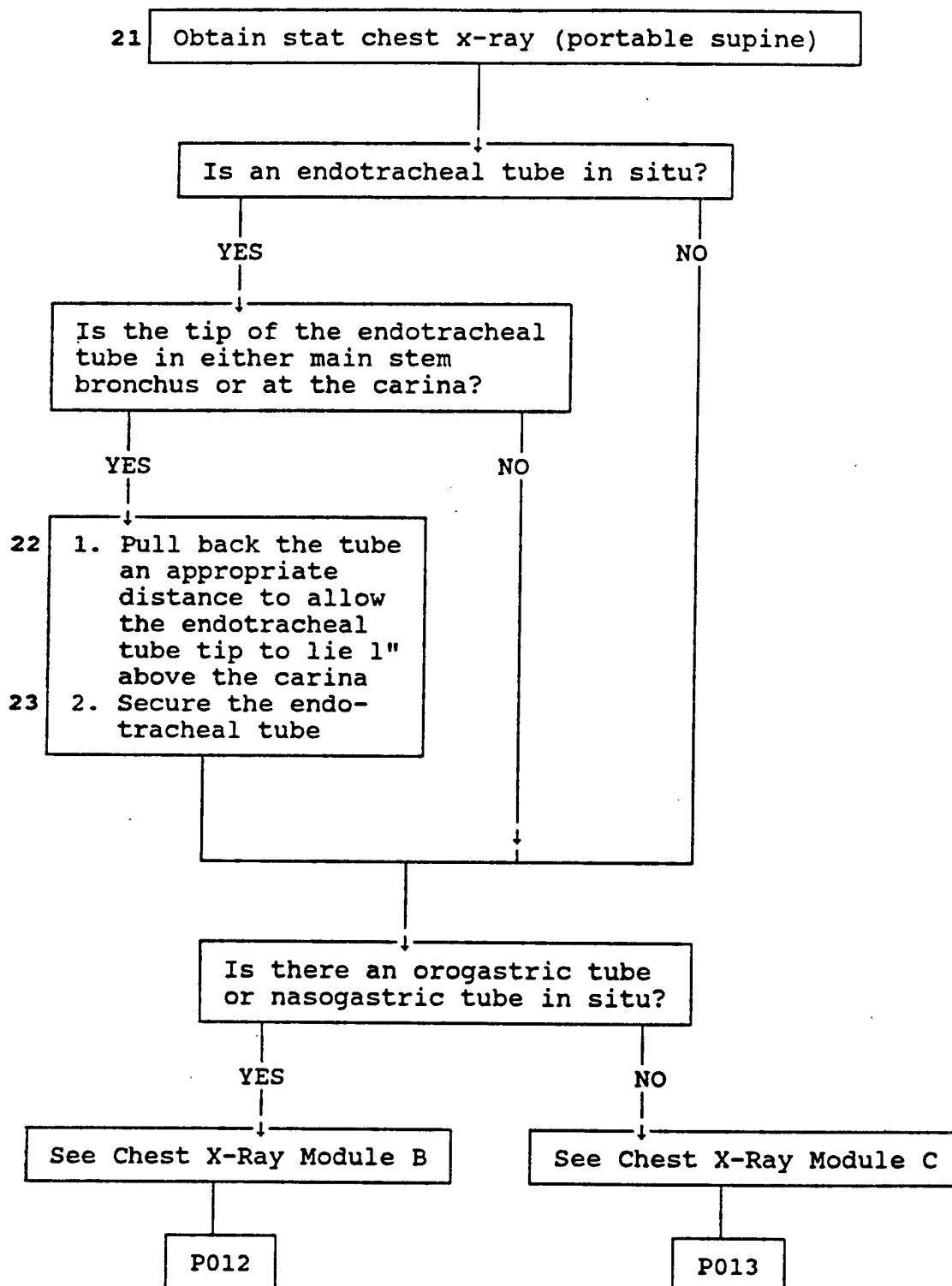
1/1



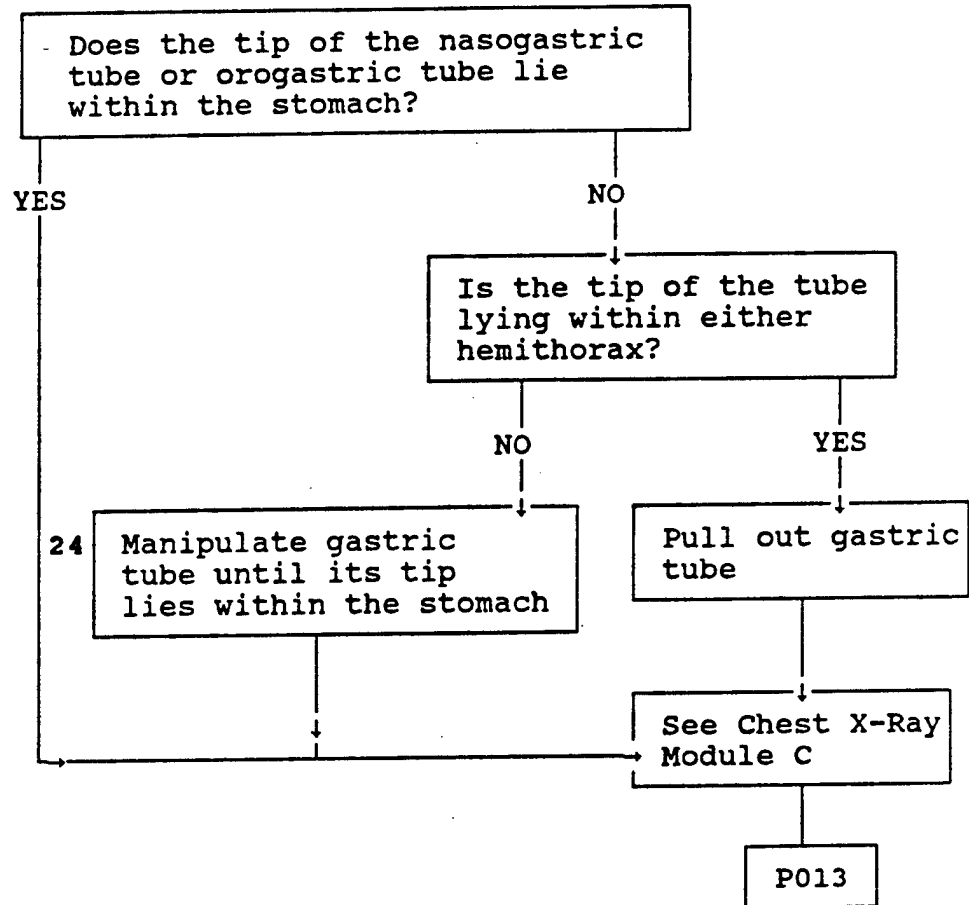
TRACHEOBRONCHIAL INJURY MODULE



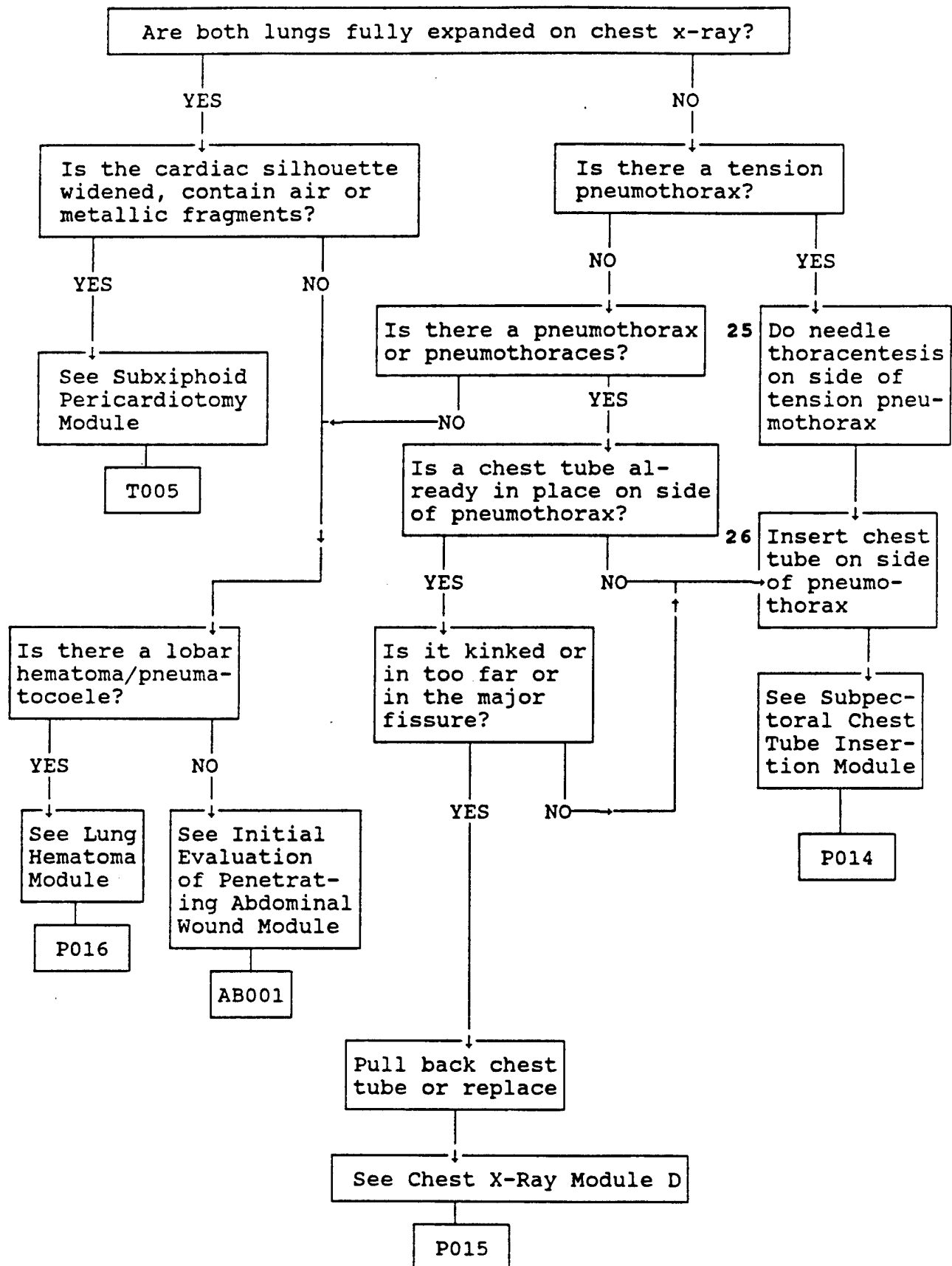
CHEST X-RAY MODULE A



CHEST X-RAY MODULE B



CHEST X-RAY MODULE C



SUBPECTORAL CHEST TUBE INSERTION MODULE

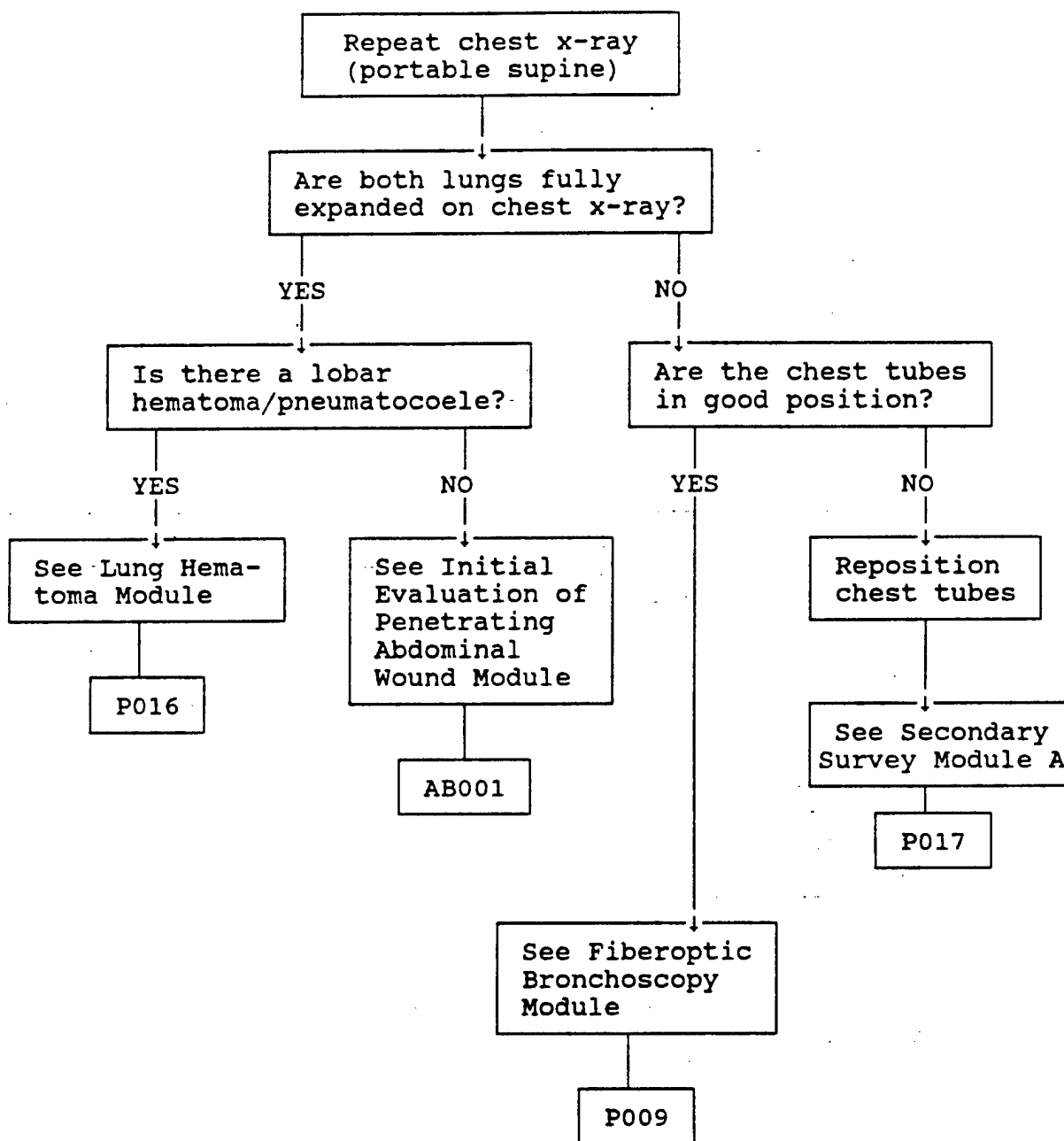
27

1. Sterile prep of chest from nipple line to posterior axillary line
2. Anesthetize skin at anterior-midaxillary line at rib space level with nipple  
Anesthetize rib space
3. Incise skin for 1 inch
4. Using scissors, cut sharply over the top of rib into the pleural space
5. Insert 36 French chest tube and attach to chest tube drainage system with -20 mm H<sub>2</sub>O suction
6. Suture tube in place with 0 silk sutures
7. Apply vaseline and sterile gauze dressing

See Chest Tube Evaluation Module

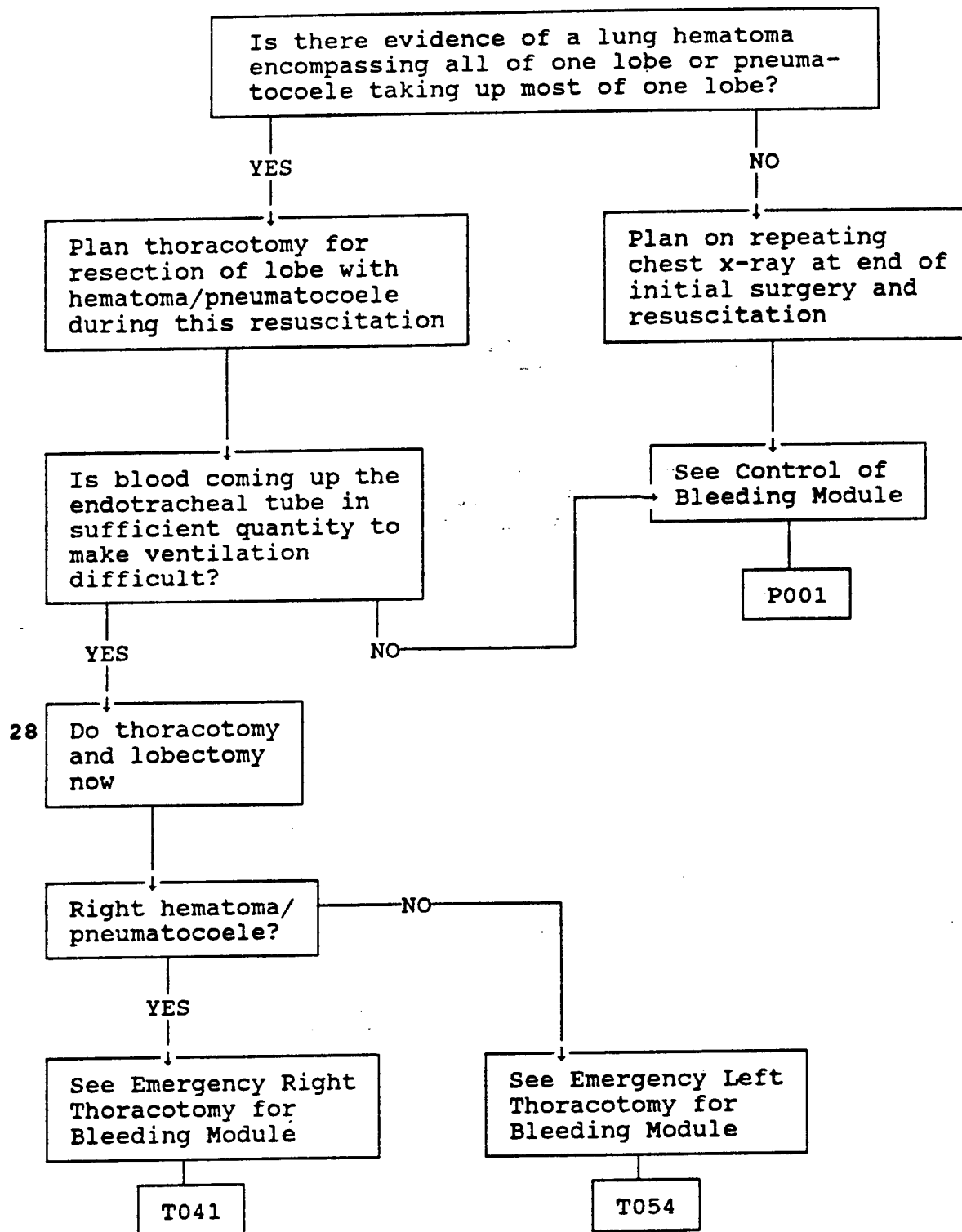
P006

CHEST X-RAY MODULE D





LUNG HEMATOMA MODULE



**SECONDARY SURVEY MODULES**

If all men were just, there would be no need for courage.  
[Agesilaus II: In Plutarch's Life of Agesilaus]

**A. Overview**

One of the major difficulties in dealing with traumatic injuries is becoming focused on specific injuries and overlooking other real or potential problems. After the ABC's have been performed, control of bleeding becomes paramount. At that time, the secondary survey can be performed, which encompasses examining the patient in greater depth, obtaining needed x-rays, and performing other procedures and interventions. In order to have a high level of successful patient outcomes, it is necessary to become quite cyclical in one's approach with a continuous review of the patient's subsystems in order to uncover any injuries that may have been overlooked in the initial evaluation. Only by constant review of the patient's status can excellent results be maintained.

The algorithms here focus initially on major bleeding, then move to the secondary survey with attention paid to stabilization and identification of those problems which are not immediately life-threatening but need to be dealt with expediently and efficiently. From here, many of the algorithms lead to examinations of specific organ subsets as injuries are suspected and/or identified. Ultimately many of those other algorithms lead back again and again to this section in order to help reinforce the cyclical nature of constant patient review. By doing so, it is hoped that all systems will be examined completely, none overlooked, and patient outcomes be assured as best as possible.

**B. Operation Desert Storm Case Reports**

[The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest.  
Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:  
CDR J.M. Linenger, MC, USN  
Naval Health Research Center

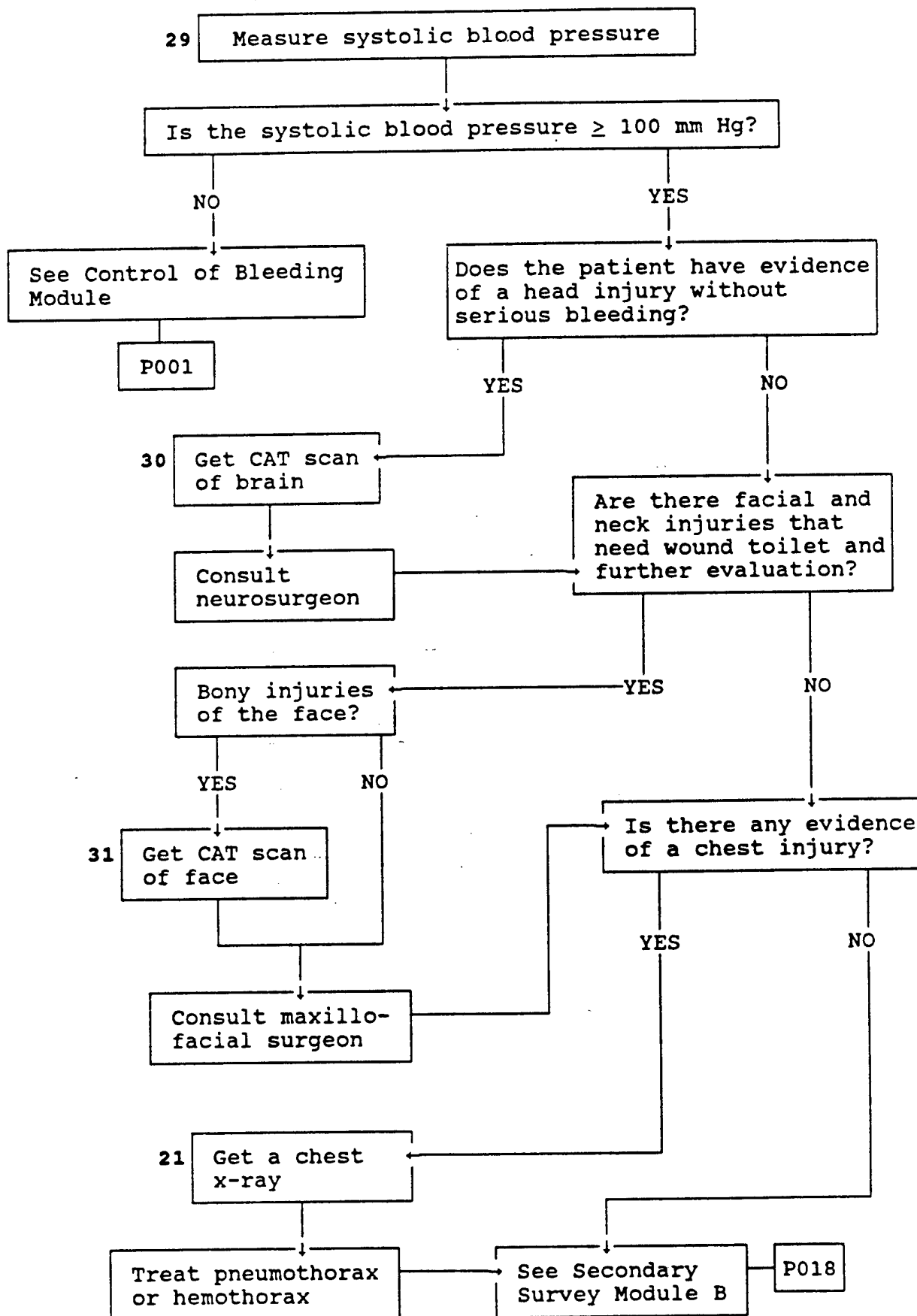
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you.]

#### C. Decision Trees

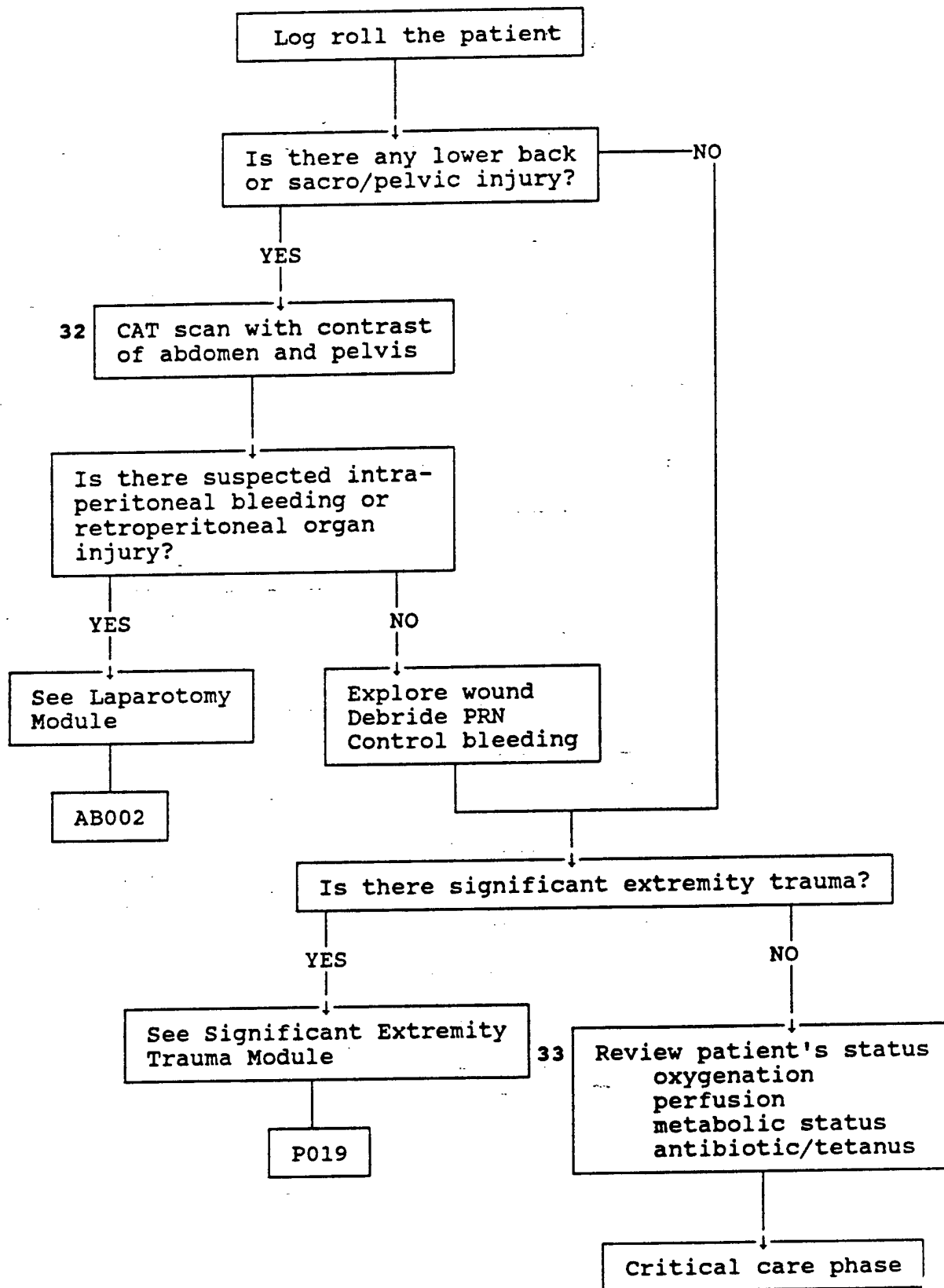
SECONDARY SURVEY MODULE A

P017  
1/1

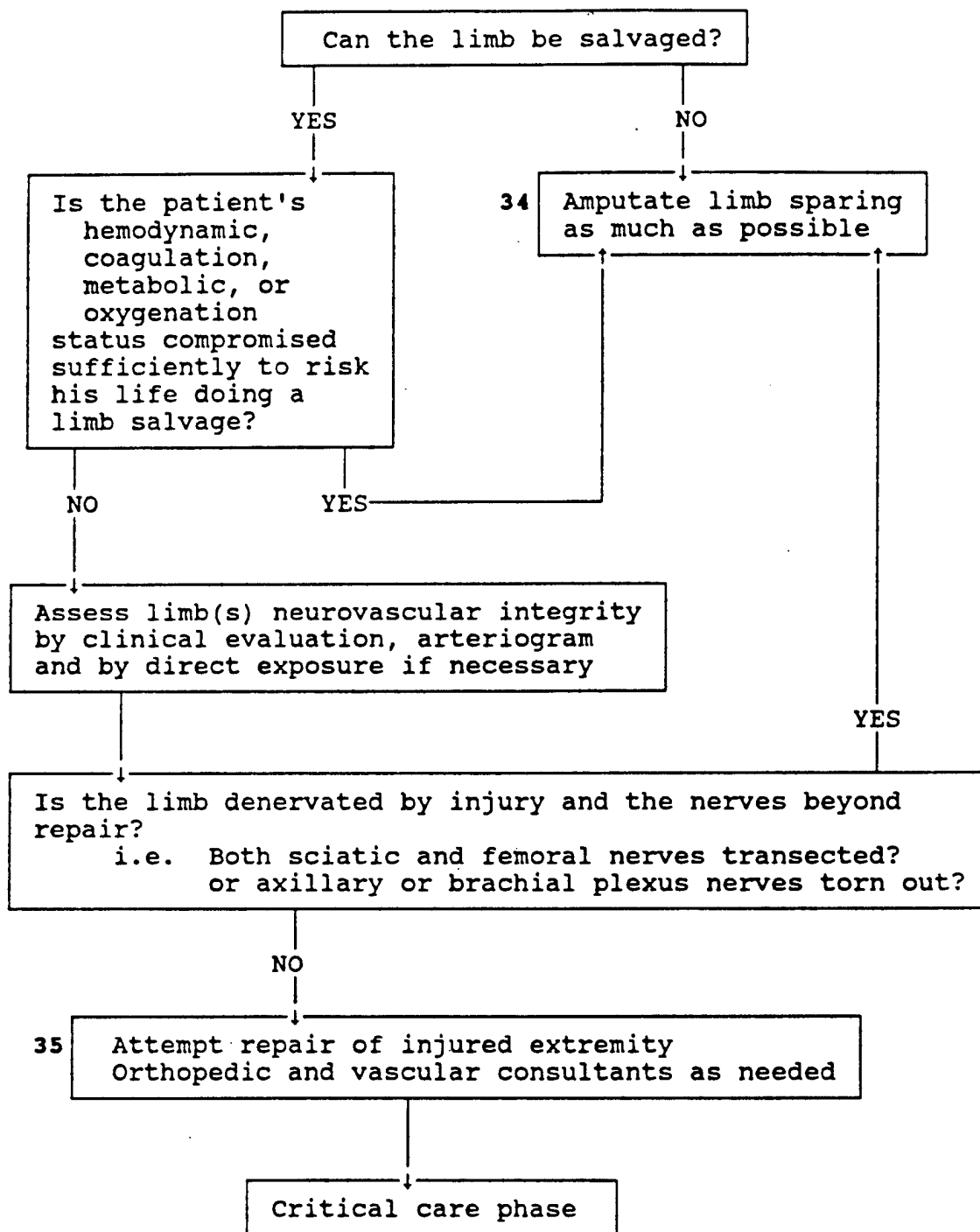


SECONDARY SURVEY MODULE B

P018  
1/1



SIGNIFICANT EXTREMITY TRAUMA MODULE



# BRAIN - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----	EQUIPMENT
	A B C D E	

The staff and equipment listing for brain procedures does not follow the standard pattern since all procedures in modules BR001 - BR008 must be accomplished by a neurosurgeon, except in BR004, where an ophthalmologist might be called upon to enucleate a severely damaged eye. However, the neurosurgeon could perform the procedure in the absence of an ophthalmologist.

BR009 and BR010, which deal with coagulopathy problems, would also involve the neurosurgeon's expertise, even though the procedures of drawing blood and administration of cryoprecipitate, frozen plasma or platelets could be done by other care providers, such as a nurse or corpsman.

Equipment lists are attached.



CRANIOTOMY EQUIPMENT LIST

SUTURE

CLIP, LIGA MEDIUM - TITANIUM  
CLIP, LIGA SMALL - TITANIUM  
NUROLON 0 MO-7  
PROLENE 3-0 FSL  
VICRYL 4-0 TF

SUPPLIES

COVER, TABLE  
CUSHION, DONUT 9"  
GOWN, STER BACK LRG  
SHEET, SPLIT  
TOWELS, STERILE (6 PK)  
TRAY, SKIN SCRUB SURGERY

GLOVES

GLOVES, EXAM LRG UNSTERILE  
GLOVES, TRIFLEX  
GLOVES, ULTRADERM

CAUTERY

CAUTERY BI POLAR  
CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, LECTROSWITCH HANDSWITC

MISCELLANEOUS

BASIN, MAJOR SET  
BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
CLIP, RANEY  
DURA HOOKS, (FISH HOOKS)  
NEEDLE, SPINAL 22 GA X 3 1/2  
RAZOR, PREP DISP  
SYRINGE, 30CC LL

SPONGES

PATTIES, SURGICAL 1/2 X 1/2  
PATTIES, SURGICAL 1/2 X 1 1/2  
PATTIES, SURGICAL 1 X 3  
SPONGE, GAUZE X-RAY DETECT

SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

SOLUTIONS

SOLUTION, IRRIG NACL 1000

INSTRUMENTS & EQUIPMENT

CRANIOTOME  
CURRETTES, NEURO  
MAYFIELD HEADREST  
NEURO INSTRUMENT SET

DRAINS

DRAIN, FLAT BLAKE 7MM FUL FLUTE  
DRAIN, JVAC-BULB RESERVOIR

DRESSINGS

DRESSING, KLING 3"  
DRESSING, GAUZE 4 X 8 12 PLY  
DRESSING, SOFBAND 4" X 5YD

CRANIUM ACCESS SET

VENTRICULAR NEEDLES W/OBTURATORS  
GLASS TIP SYRINGE (PROTECT)  
METAL BRAIN SPOON  
METAL BRAIN RETR 1-5 VARIABLE 5  
TEFLON COATED RETR 1-5 VARI

## NECK AND FACE

The goal of war is peace; of business, leisure.  
[Aristotle: Politics IV

## A. Overview

Facial and neck injuries are frequently bloody due to the vascularity of the region. However, not all are immediately life threatening. Airway and esophageal injuries are rarer but serious if not diagnosed and treated.

The modules present a straightforward approach to facial and neck bleeding, and cover neck exploration and the thought process involved in the need for emergency neck surgery. The major emphasis is on bleeding, since this is the most frequent problem with penetrating trauma in these areas. Appropriate attention to face and neck injuries may prevent serious neurologic impairment and morbidity.

## B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involved in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he

was sent to the OR approximately 45 minutes after the initial injury.

5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail  
to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]

### C. Decision Trees

# NECK AND FACE - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Debride wound and close primarily or apply sterile dressing	2*	3				Scalpel; blade; clamps; irrigating normal saline solution; suture; dressing; needle holder; tape
2. Neck exploration	2*	3				Scalpel; blade; clamps; irrigating normal saline solution; suture; dressing; needle holder; tape
3. Metal clip for identification	2*	3				Metal clip
4. Gain proximal arterial control	2*	3				Clamps; suture; needle holder
5. Median sternotomy or trap door incision	2*	3				Median sternotomy list
6. Place arterial shunt	2*	3				Median sternotomy list
7. Harvest saphenous vein and do interposition graft	2*	3				Median sternotomy list; Saphenous Vein Harvest list
8. Do interposition graft with Gortex	2*	3				Median sternotomy list
9. Primary repair of jugular vein with vascular suture	2*	3				Suture; needle holder; scalpel; blade; clamps
10. Ligate thyroid bleeders and debride nonviable tissue	2*	3				Suture; needle holder; scalpel; blade; clamps
11. Monitor patient for hypocalcemia			3	3	1*	Syringe; laboratory capability
12. Close pharyngeal wound	2*	3				Scalpel; blade; clamps; suture; needle holder
13. Over sew distal esophagus	2*	3				Scalpel; blade; clamps; suture; needle holder
14. Perform wide drainage from esophageal or pharyngeal wound to skin	2*	3				Scalpel; blade; clamps; suture; needle holder; penrose drain

\*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*  
In all cases, through point 21, a general surgeon with extensive training could be considered optimal but a thoracic surgeon or ear/nose/throat surgeon is preferred. Point 22 and 23 could be handled by a general surgeon or trauma surgeon optimally.  
In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks. Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

15. Perform feeding enterostomy	2*	3				Feeding catheter; suture; clamps; scalpel blade; needle holder; irrigating solution
16. Perform esophagostomy or pharyngostomy	2*	3				Sternal saw
17. Tracheostomy	2*	3				#15, #11 knife blade/handle; scalpel; scissors; Bovie/needle tip; tracheostomy tube or wire-wound endotube
18. Repair larynx injury with monofilament suture	2*	3				Scalpel; blade; clamps; needle holder; monofilament suture
19. Repair trachea with monofilament suture	2*	3				Scalpel; blade; clamps; needle holder; monofilament suture
20. Resect. 1-2 rings of trachea as needed	2*	3				Scalpel; blade; clamps; needle holder; monofilament suture
21. Secure airway with tube thru severed end of trachea	2*	3				Suture; airway tube; needle holder; tape
22. All procedures- external bleeding from facial or scalp wounds	3	3	1*	1*	1*	Sterile gauze; hemostats; 4 x 4's; sutures; vaseline gauze
23. All procedures- Initial management of tongue injury	3	3	1*	1*	1*	Lidocaine; epinephrine; 18 gauge & 25 gauge needle; syringe; suture; needle holder; light source

CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER

GIERTZ RIB CUTTER

DOYEN ELEVATORS (1 LT & 1 RT)

ALEXANDER

MATSON

RIB APROXIMATORS (MOVEABLE)

ADSON RONGEUR

TONSIL SUCTION

VEIN RETRACTORS

DEEP RAKES

SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH

LONG FINE THUMBS W/OUT TEETH

EXTRA LONG RUSSIAN

EXTRA LONG THUMB W/OUT TEETH

LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR

EX LONG N.B.

EX LONG FINE N.H.

EX LONG CURVES

EX LONG CARMALT

REGULAR CARMALTS

EX LONG RUMEL

BRONCHUS CLAMPS

RUMEL THORACIC ARTERY CLAMPS

DUVAL LUNG CLAMPS SEMB

SEMB

LONG ALLISES

TONSILS

MEEKER

KIDNEY PEDICAL CLAMP

REGULAR RUMELS

REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR

PEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES

#3 LONG KNIFE HANDLE

EXTRA LONG INSTRUMENTS

CONTENTS

---

EXTRA LONG NEEDLE HOLDER  
EXTRA LONG FINE NEEDLE HOLDER  
EXTRA LONG CURVES  
REGULAR RUMEL  
MEEKERS  
BRIDGE FORCEPS  
EXTRA LONG ALLISES  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB WITHOUT TEETH  
LONG BABCOCKS  
EXTRA LONG METZ



# MEDIANSTERNOTOMY EQUIPMENT LIST

## SUTURE

MAXON 2-0 T-25  
MAXON 3-0 t-25  
SILK 3-0 SH  
SILK 2-0 SH  
SILK 3-0 STRAND  
SILK 2-0 STRAND  
STAPLE LOADING UNIT SM-35W

## SUPPLIES

BASIN, MAJOR SET  
GOWN, STER BACK LRG  
GOWN, STER BACK XLRG  
SHEET, LAB  
SHEET, MEDIUM  
TABLE COVER  
TRAY, SKIN SCRUB

## GLOVES

GLOVES, EXAM LRG UNSTERILE  
GLOVES, TRIFLEX

## CAUTERY

CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, LECTROSWITCH HANDSWITCH

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #21  
BONE WAX W-31G  
DACRON TAPE 8618-00  
DURA HOOKS, (FISH HOOKS)  
MAGNETIC INSTRUMENT MAT  
MAGNETIC NEEDLE MAT  
NEEDLE, SPINAL 22 GA X 3 1/2  
SYRINGE, 30CC LL  
SYRINGE, BULB

## SPONGES

SPONGE, 18 X 18 LAP  
SPONGE, GAUZE X-RAY DETECT  
SPONGE, KITTNER DIRECTORS

## SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

## SOLUTIONS

SOLUTION, IRRIG WATER 1500ML  
SOLUTION, IRRIG NACL 1000

## INSTRUMENTS & EQUIPMENT

CARDIOVASCULAR TRAY  
CHEST SET  
EX. LONG INSTRUMENTS  
HEADLIGHT  
LAP SET  
N H, EX LONG  
RET, HIMMELSTEIN  
RETR, MOARSE  
SARNS SAW  
SCISSOR, LONG FINE METZ  
TRAUMA CHEST TRAY

## DRAINS

CHEST TUBE 32FR THORACIC  
CHEST TUBE 36FR THORCIC  
PLEUROVAC, ADULT

## DRESSINGS

DRESSING, GAUZE 4X8 12 PLY  
DRESSING, TELFA

## VASCULAR

FELT 3 X 3  
SUTURE BOOTS  
VESSEL LOOPS, MAXI  
VESSEL LOOPS, MINI

NECK AND FACE EQUIPMENT LIST

SUTURE

-----  
CHROMIC, 3-0 REEL  
SILK 2-0 STRAND  
SILK 3-0 SE  
SILK 3-0 STRAND  
STAPLE, LOADING UNIT SM-35W

SUPPLIES

-----  
COVER, MAYO STAND  
COVER, TABLE  
GOWN, STER BACK LRG  
GOWN, STER BACK XLRG  
SHEET, THYROID  
TOWELS, STERILE (6 PK)  
TRAY, SKIN SCRUB

GLOVES

-----  
GLOVES, EXAM LRG UNSTERILE  
GLOVES TRIPLEX

CAUTERY

-----  
PAD, GROUNDING ADULT  
PENCIL, LECTROSWITCH HANDSWITC  
CAUTERY MACHINE

MISCELLANEOUS

-----  
BASIN, MAJOR SET  
NERVE STIMULATOR, VARISTIM III  
RAZOR, PREP DISP  
SYRINGE, 30CC LL  
SYRINGE, IRRIGATION-BULB ASEPTO

SPONGES

-----  
SPONGE, GAUZE X-RAY DETECT  
SPONGE, LAP 12"12  
SPONGES, KITTNER DISSECTORS

SUCTION

-----  
RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT  
YANKAVER, SUCT. DISP INSTR.

SOLUTION

-----  
SOLUTION, IRRIG NACL 1000  
SOLUTION, IRRIG WATER 1500ML

INSTRUMENTS & EQUIPMENT

-----  
CARDIO VASCULAR TRAY  
CAROTID/RADICAL NECK SET  
HEADLIGHT  
MINOR SET

DRAINS

-----  
DRAIN, HEMOVAC MEDIUM KIT

DRESSINGS

-----  
DRESSING, TELFA  
DRESSING, GAUZE 4x8 12 PLY

SAPHENOUS VEIN HARVEST EQUIPMENT LIST

SUTURE

-----  
SILK 4-0 STRAND  
SILK 2-0 STRAND  
PROLENE 5-0 RB-2  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
VICRYL 4-0 FS-2

DRAPES & SUPPLIES

-----  
DRAPE, SPLIT SHEET  
MEDIUM, SHEET 44 X 60"  
MAYO STAND COVER  
BASIN SET W/GRADUATE & MED CUP  
4 X 4 X-RAY DETECT  
SAPHENOUS VEIN CANNULA  
GOWN, SURGEON'S XTR. LRG. (2)  
GLOVES, SURGEON'S. ASSORT. SIZES  
SYRINGE, 30 CC L.L.  
CAUTERY, HANDSWITCH PENCIL  
PAD, GROUND ADULT  
0.9% NACL 500 CC  
BAG-O-JET TRANSFER UNIT  
BLADE, SURGICAL #10 (2)  
SYRINGE, 10 CC W/ 21 GA 1 1/2"  
NEEDLE

INSTRUMENTS

-----  
TRAUMA TRAY  
CAUTERY MACHINE

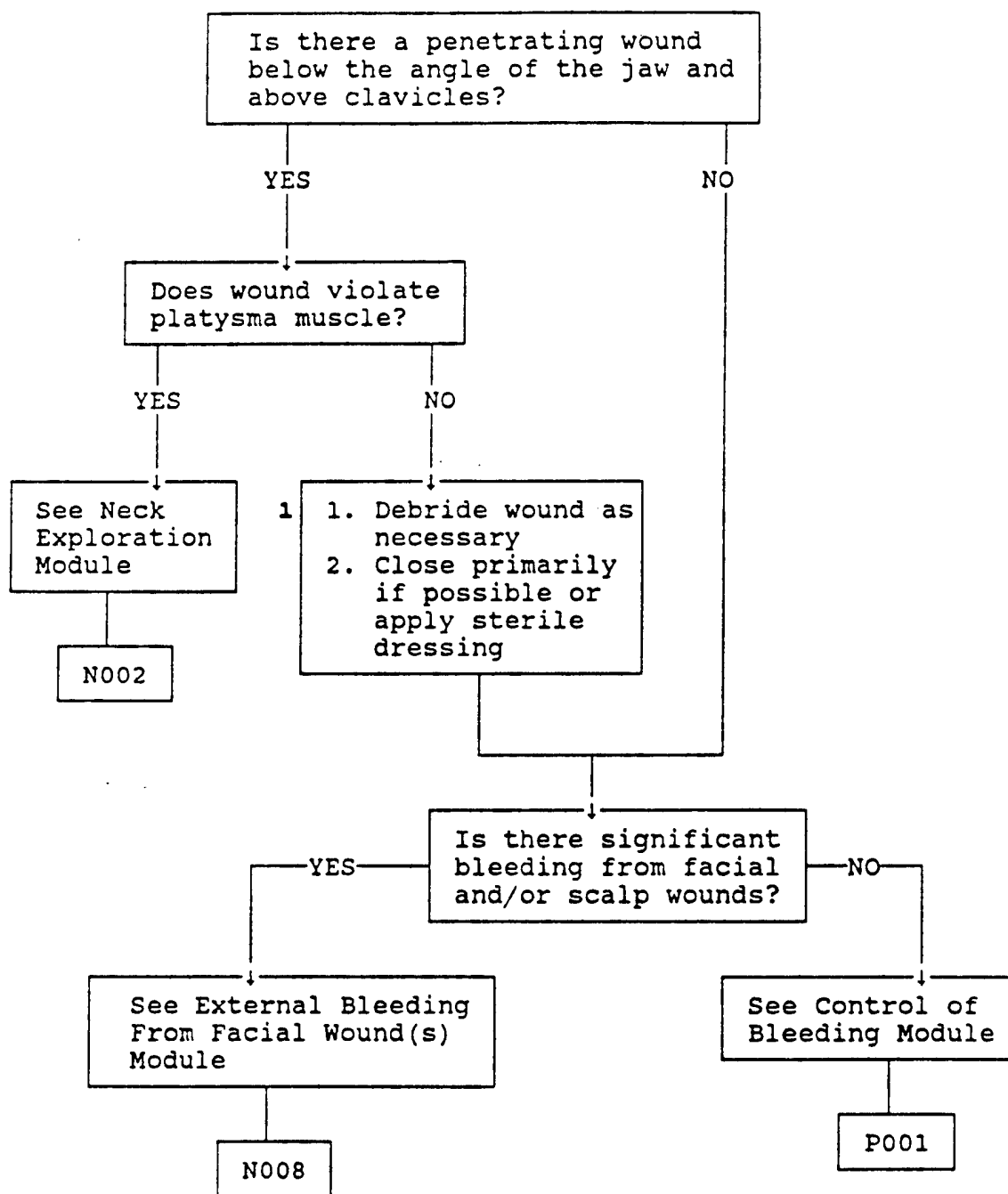
DRUGS

-----  
HEPARIN 10,000 U  
BACITRACIN 50,000 U

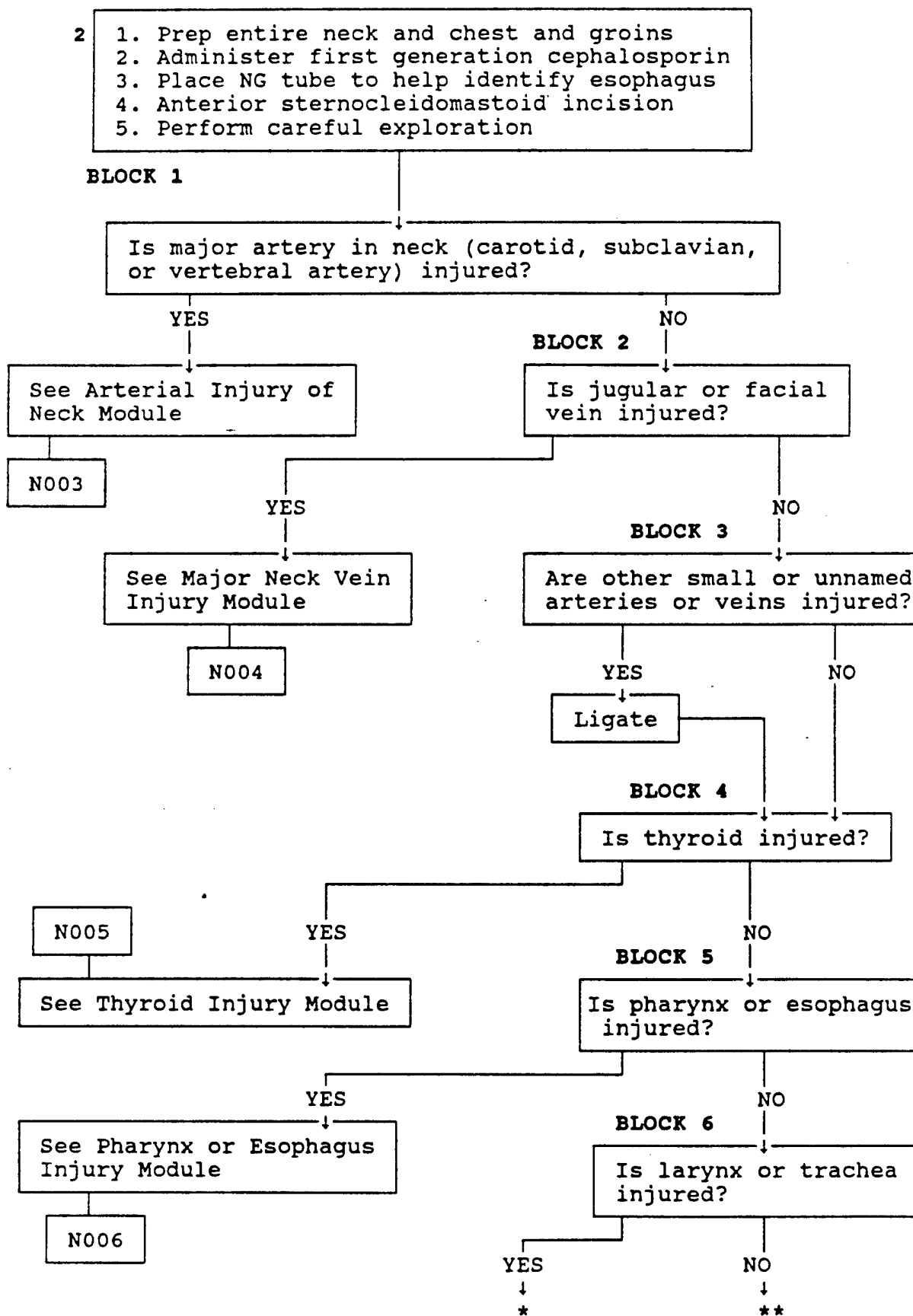
DRESSINGS

-----  
TELFA  
ELASTIC BANDAGE 4" & 6"

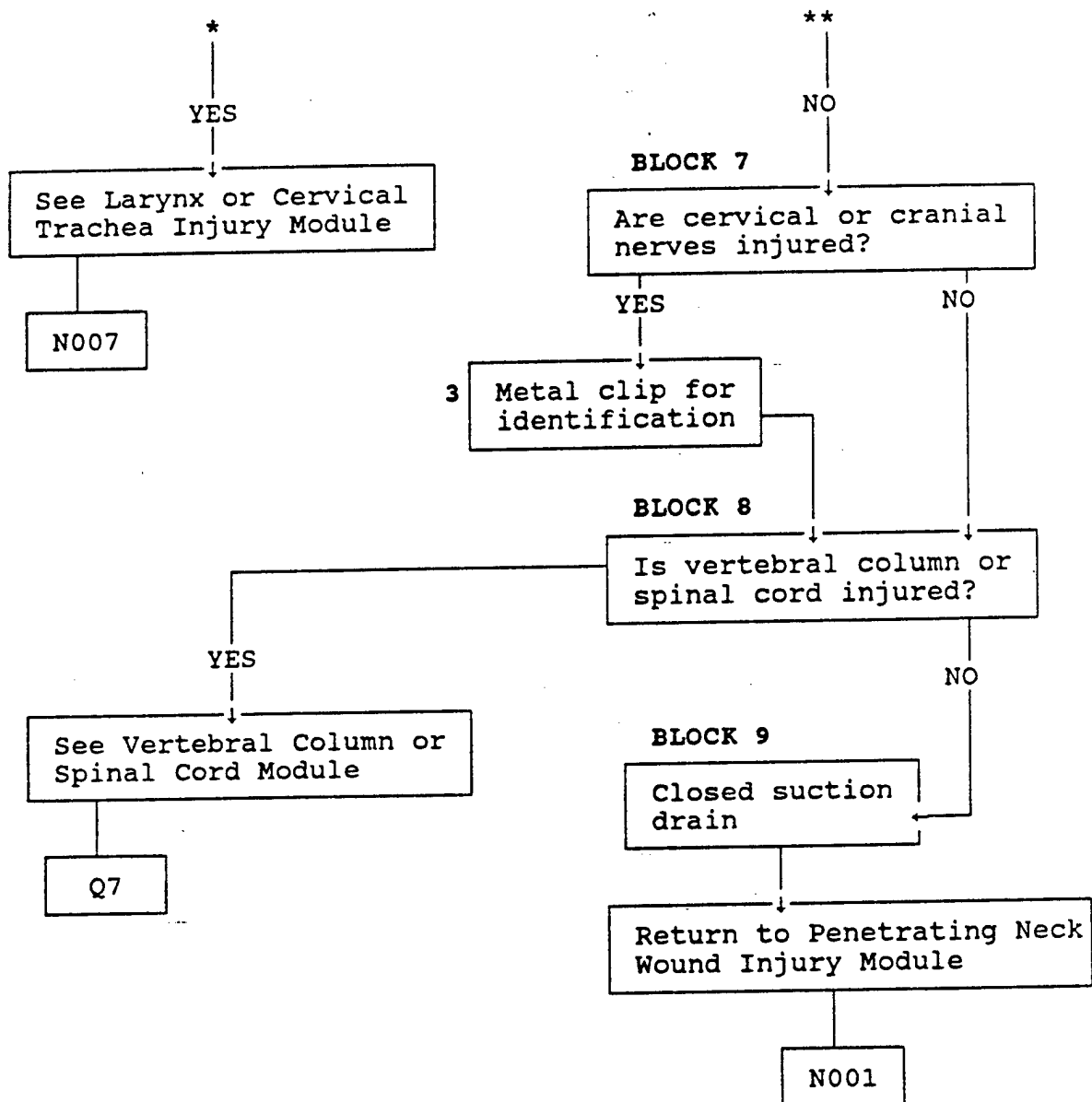
PENETRATING NECK WOUND INJURY MODULE



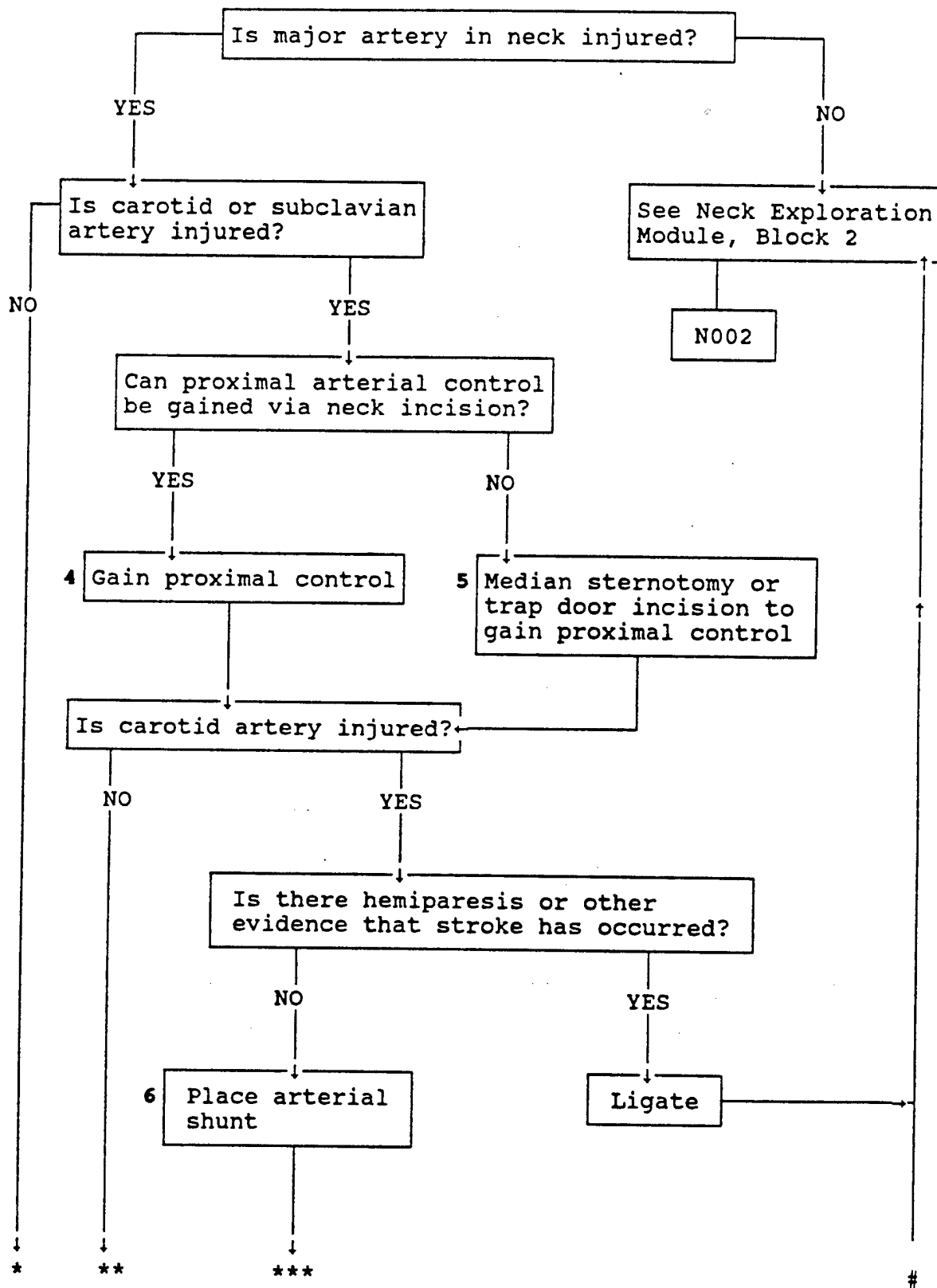
NECK EXPLORATION MODULE

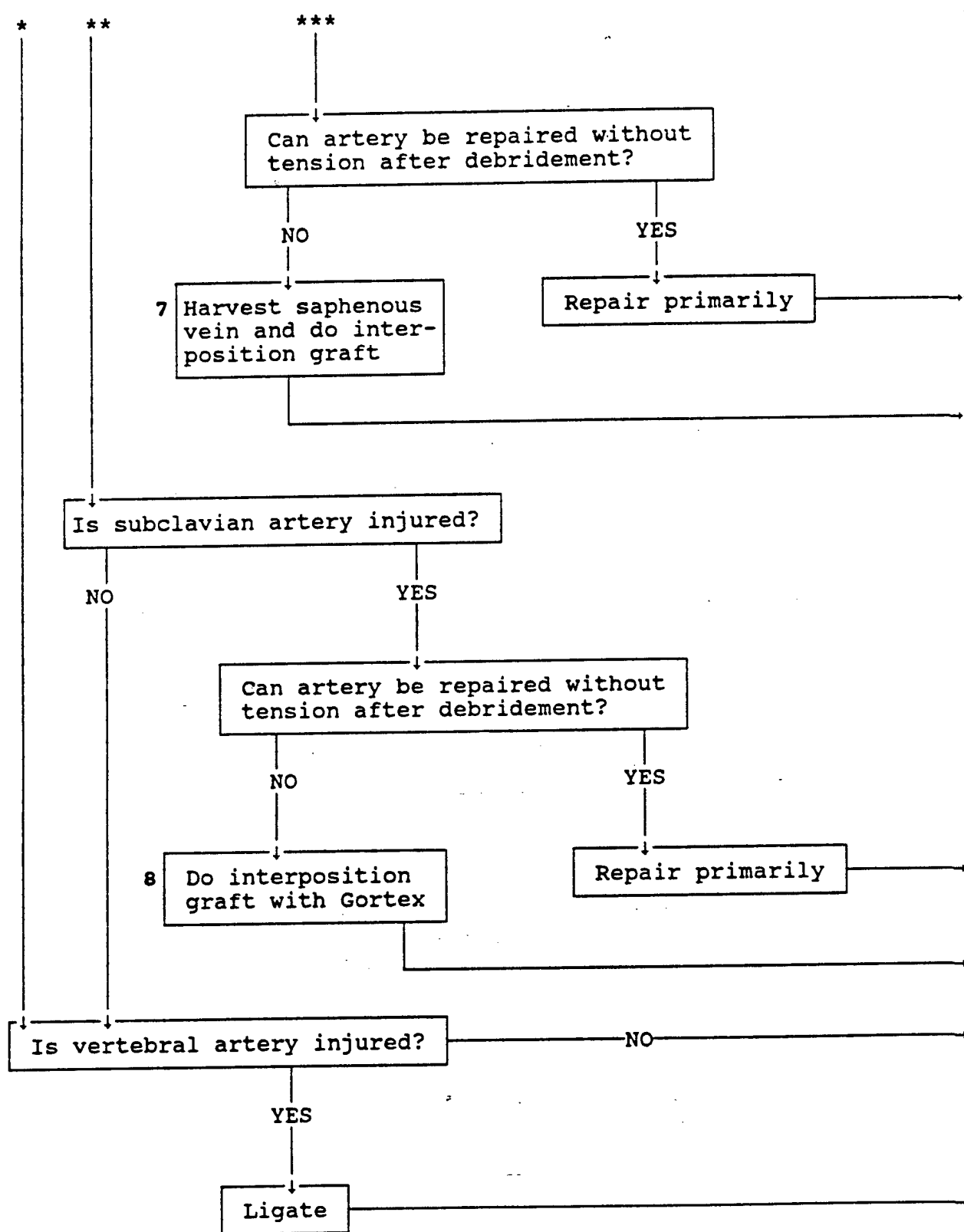


NECK EXPLORATION MODULE (cont'd.)



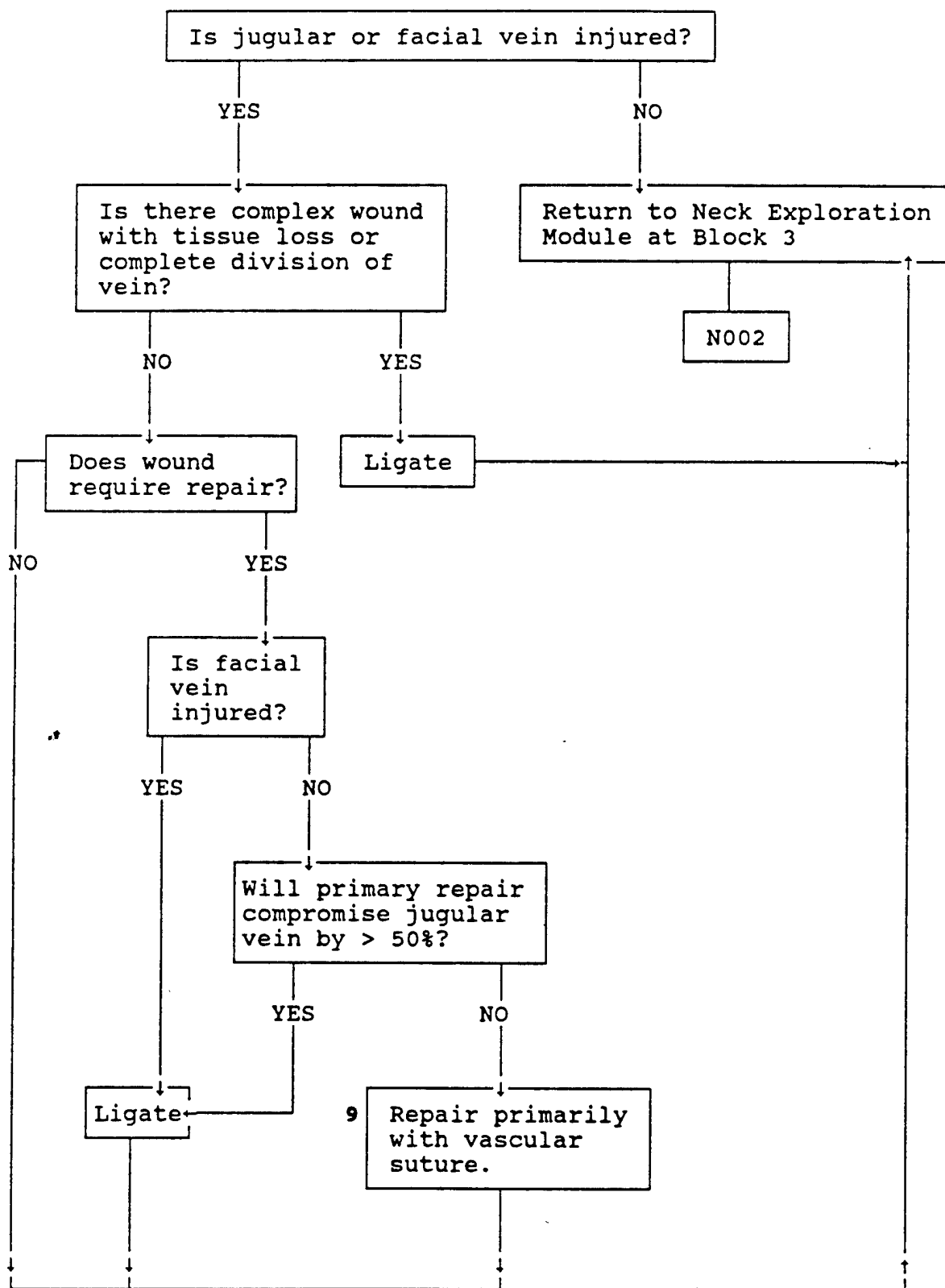
ARTERIAL INJURY OF NECK MODULE



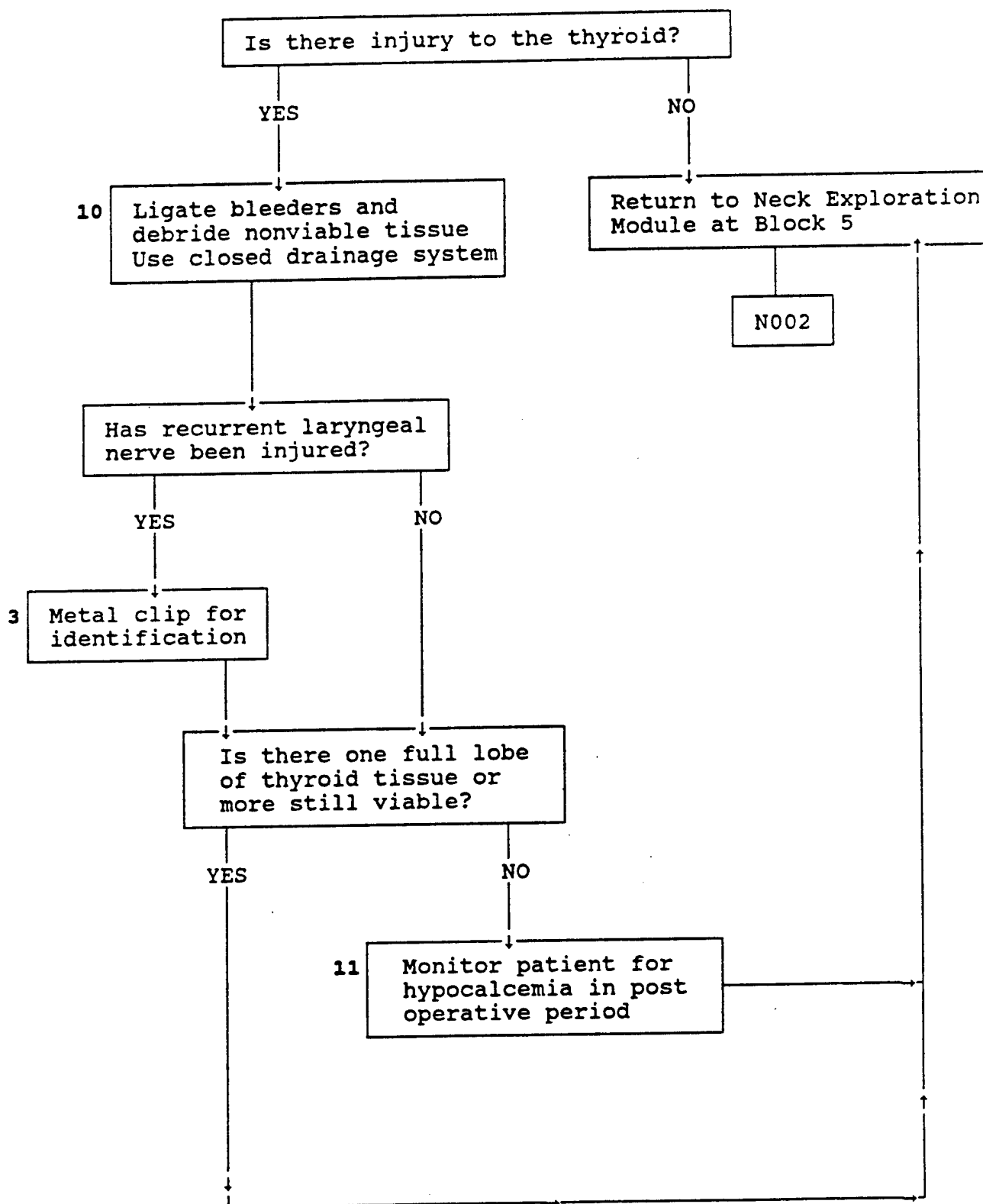




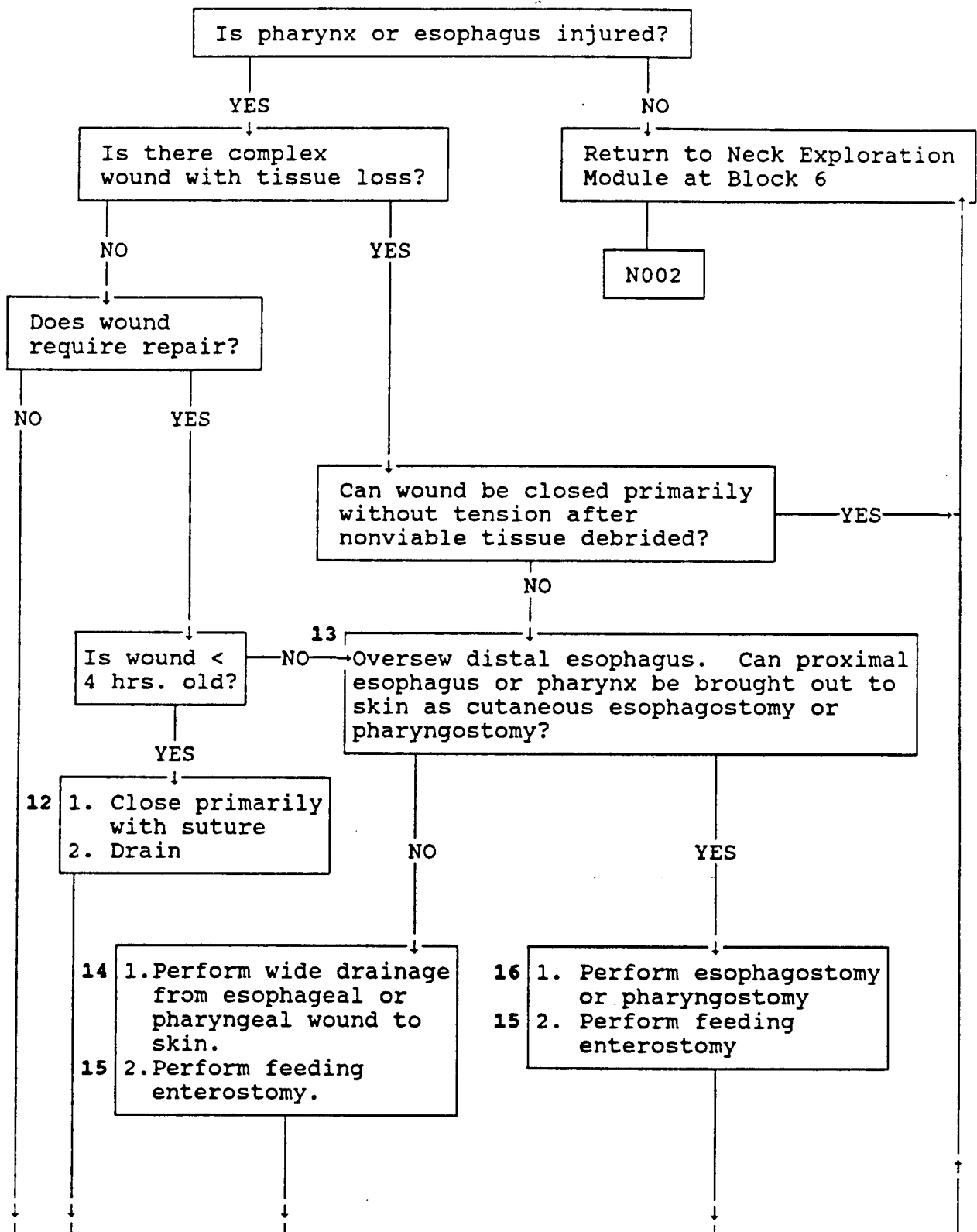
MAJOR NECK VEIN INJURY MODULE

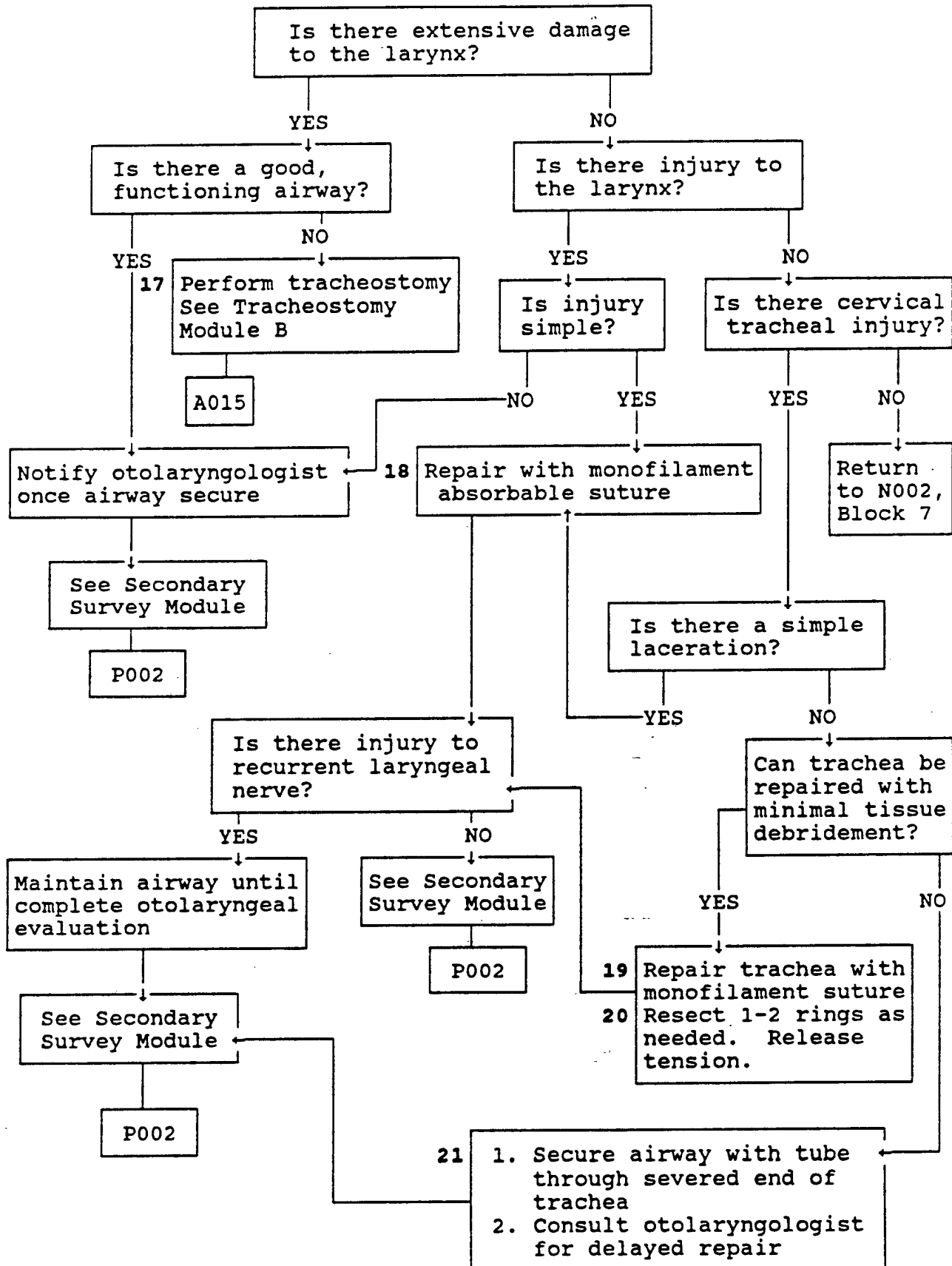


THYROID INJURY MODULE

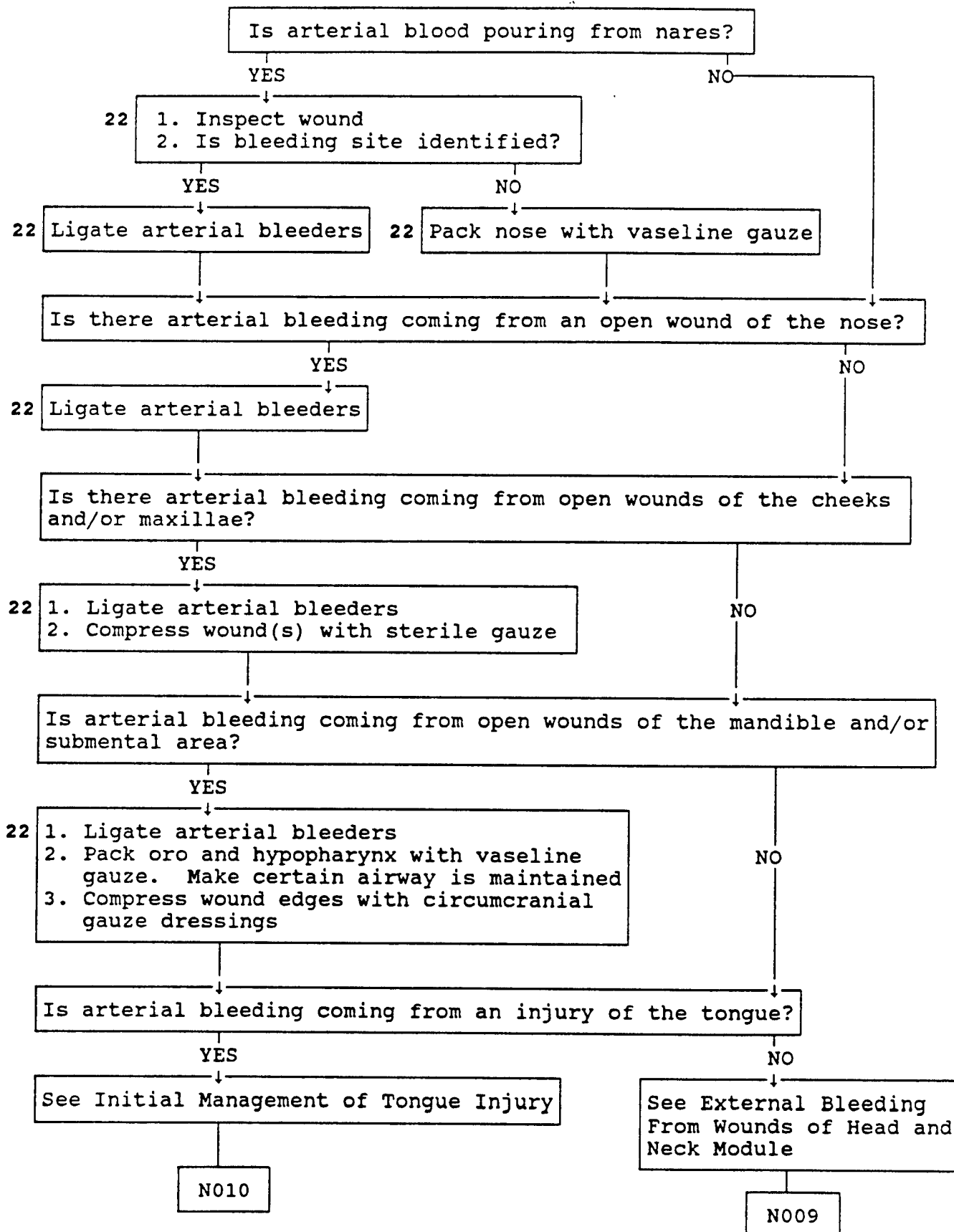


PHARYNX OR ESOPHAGUS INJURY MODULE

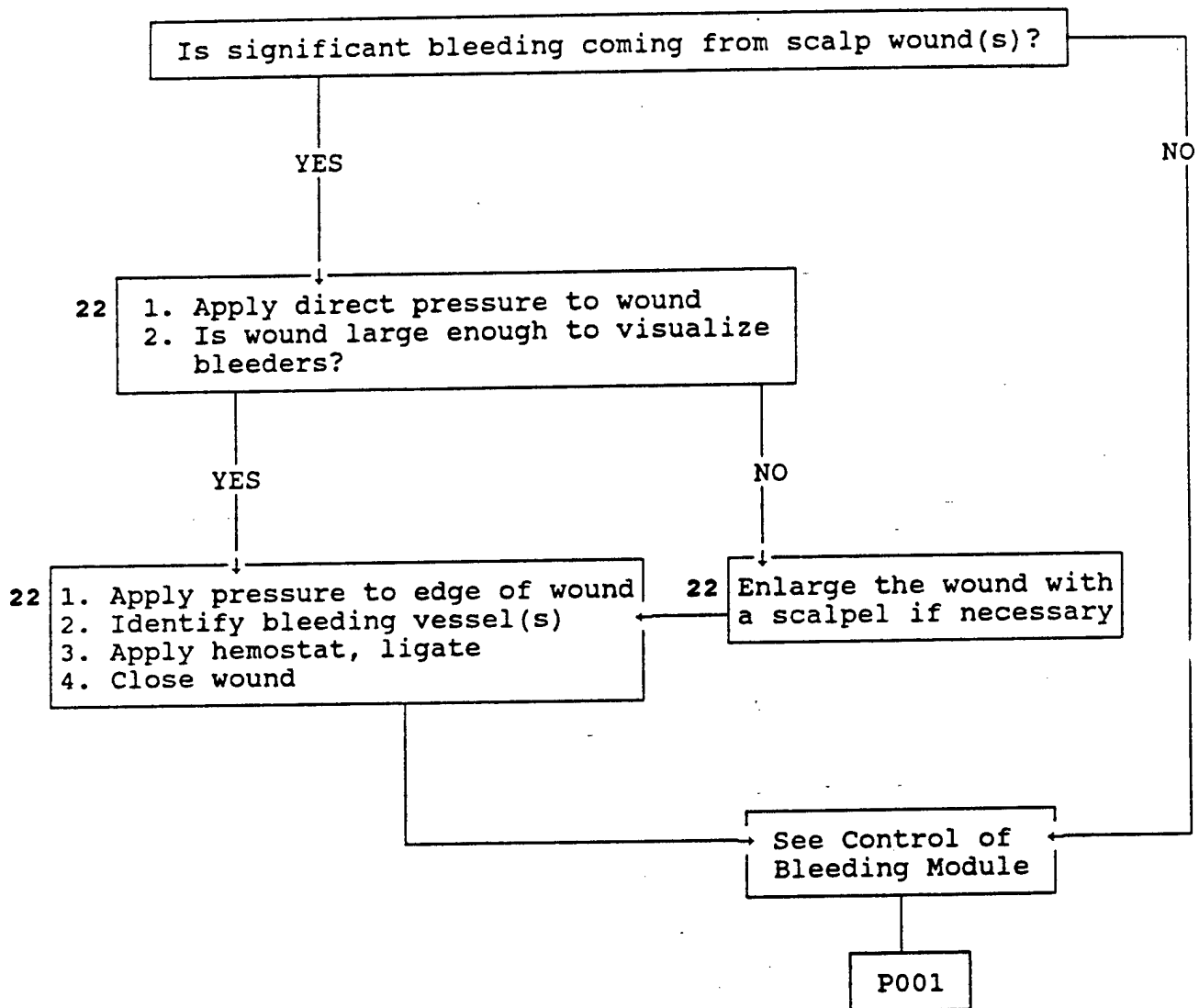




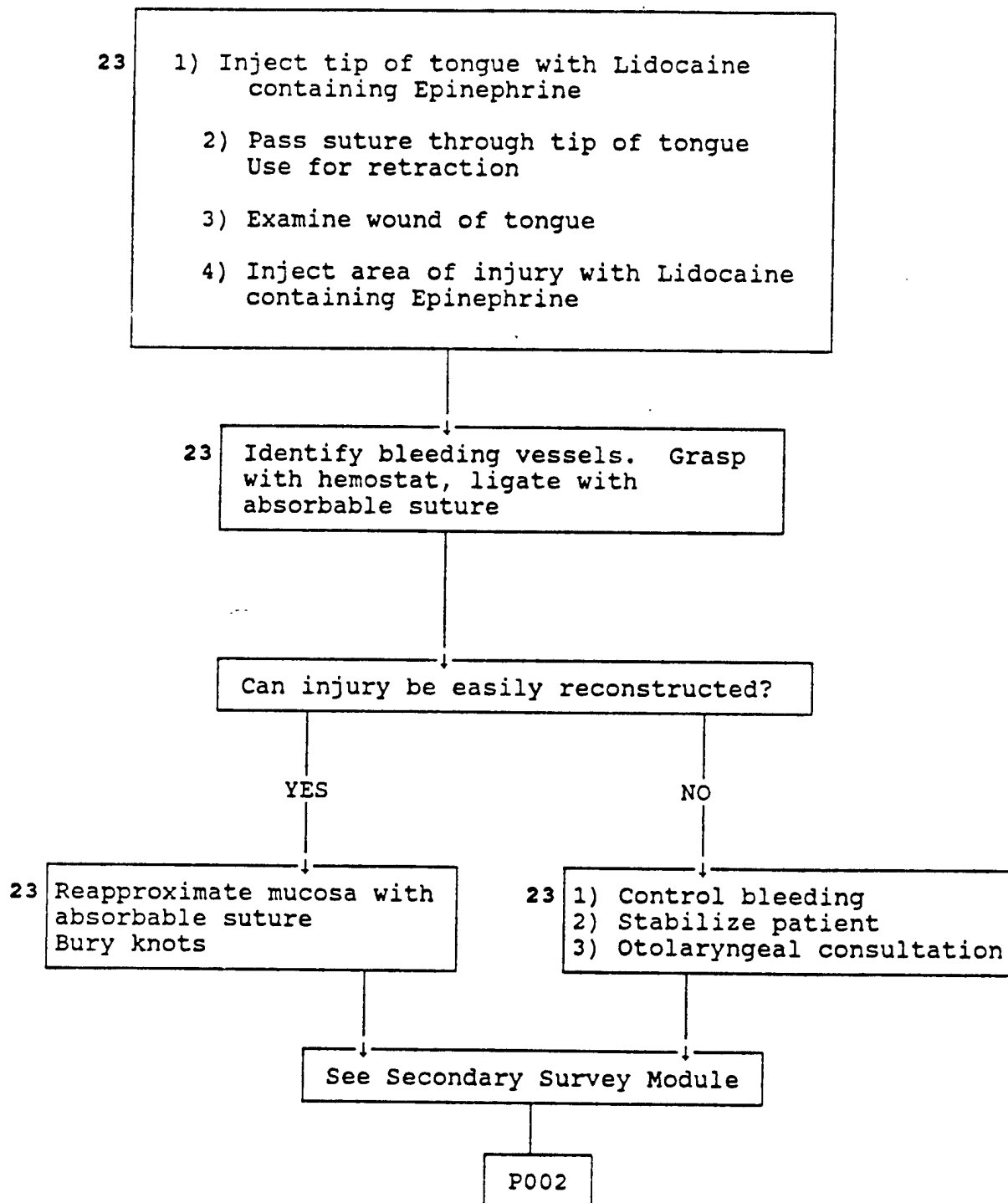
EXTERNAL BLEEDING FROM FACIAL WOUND(S) MODULE



EXTERNAL BLEEDING FROM WOUNDS  
OF HEAD AND NECK MODULE



INITIAL MANAGEMENT OF TONGUE  
INJURY MODULE



appreciate your contributions. Thank you.

]

### C. Decision Trees



. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .

3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly

8  
BRAIN INJURY

He threatens many who injures one.  
[Publilius Syrius: Maxims]

A. Overview

Neurologic injury is potentially the most devastating of major traumatic events. Surgical intervention into traumatic brain injury involves controlling major bleeding and salvaging as much viable neurologic tissue as possible. Since bleeding into the relatively closed cranium can itself lead to compression injury of brain substance, identification of injuries which may result in major intracranial vascular disruption needs to be done quickly and expeditiously.

Knowledge of cranial and brain anatomy is required to appropriately choose the incisions and approaches requested in these modules. Controlling bleeding and debriding bone and devitalized brain constitute the majority of the material here. Closure of the wounds, with particular attention to fluid tight suture lines and allowing for edema formation, is a critical area. Successful treatment of the damaged brain, dura, skull and scalp is the initial step in returning the neurologically impaired individual to a level of useful function.

This set of algorithms presumes that the patient has been stabilized and that the location of the injury(ies) has been identified. Thus the user proceeds to the appropriate module.

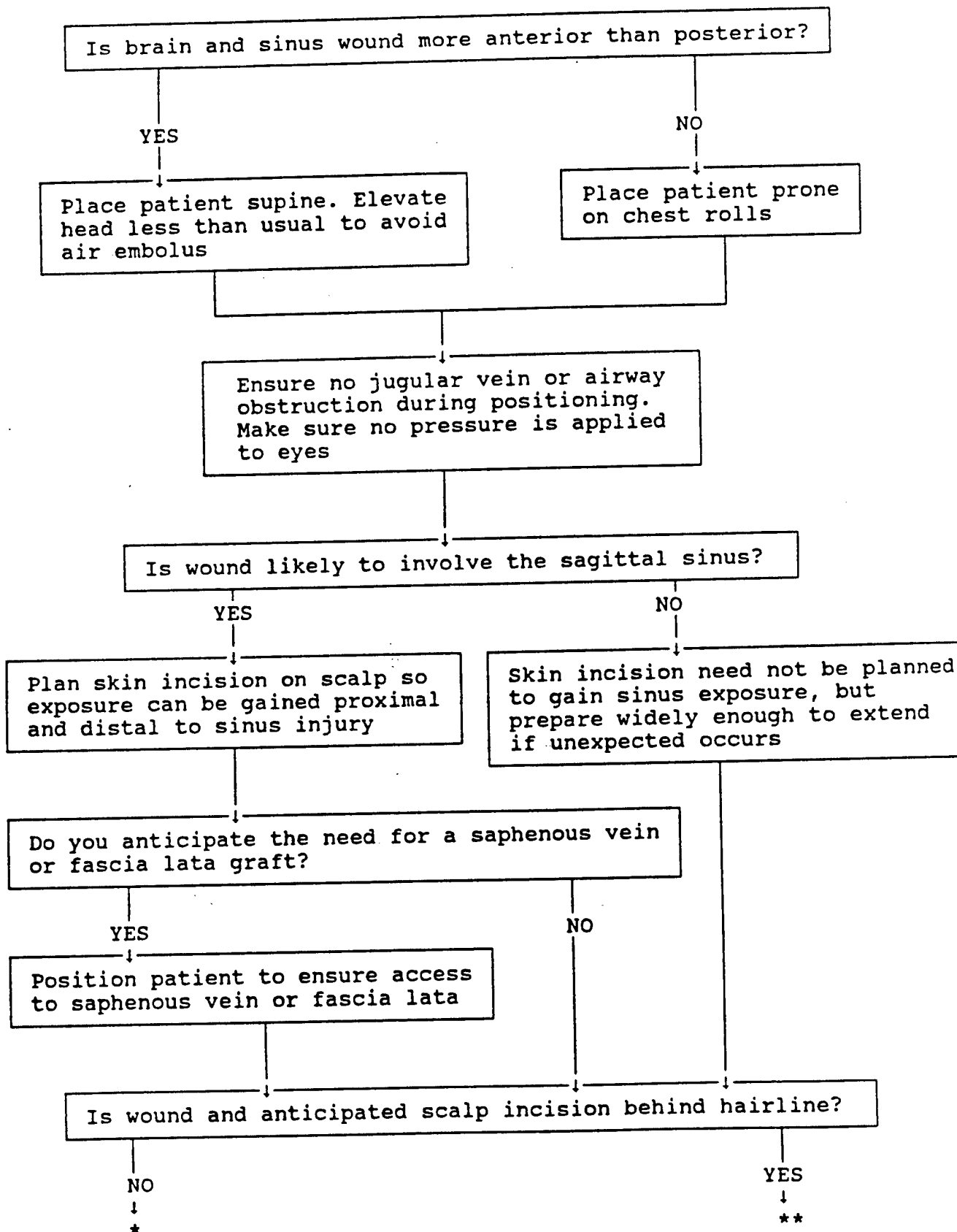
B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.

BRAIN WOUND WITH VENOUS SINUS INJURY  
(SAGITTAL SINUS) MODULE



\*\*  
YES

\*  
NO

Design opening skin incision with an eye to closing it without any tension

- If a horseshoe skin flap is made around the missile entry site, make sure that base will have adequate blood supply and that height of flap does not exceed 2-3 x base
- If possible, avoid making a new incision in forehead (cosmetic considerations)
- 2 layer closing of galea and skin

Prepare incision widely enough to extend if unexpected occurs

Can anticipated skin incision be closed without tension?

NO

YES

Create sliding scalp flap or plan relaxing incisions

- Sliding scalp flap: place debrided scalp wound in one limb of scalp flap. Leave periosteum on skull under distal limb of scalp flap to aid subsequent skin grafting
- Relaxing incision placed at a distance so "lazy S" incision incorporating debrided wound will close relaxing incision made at end of case during scalp closure

Debride scalp wound and incorporate debrided scalp wound in a "lazy S" incision

With skull visualized do you estimate that missile wound involves sagittal sinus?

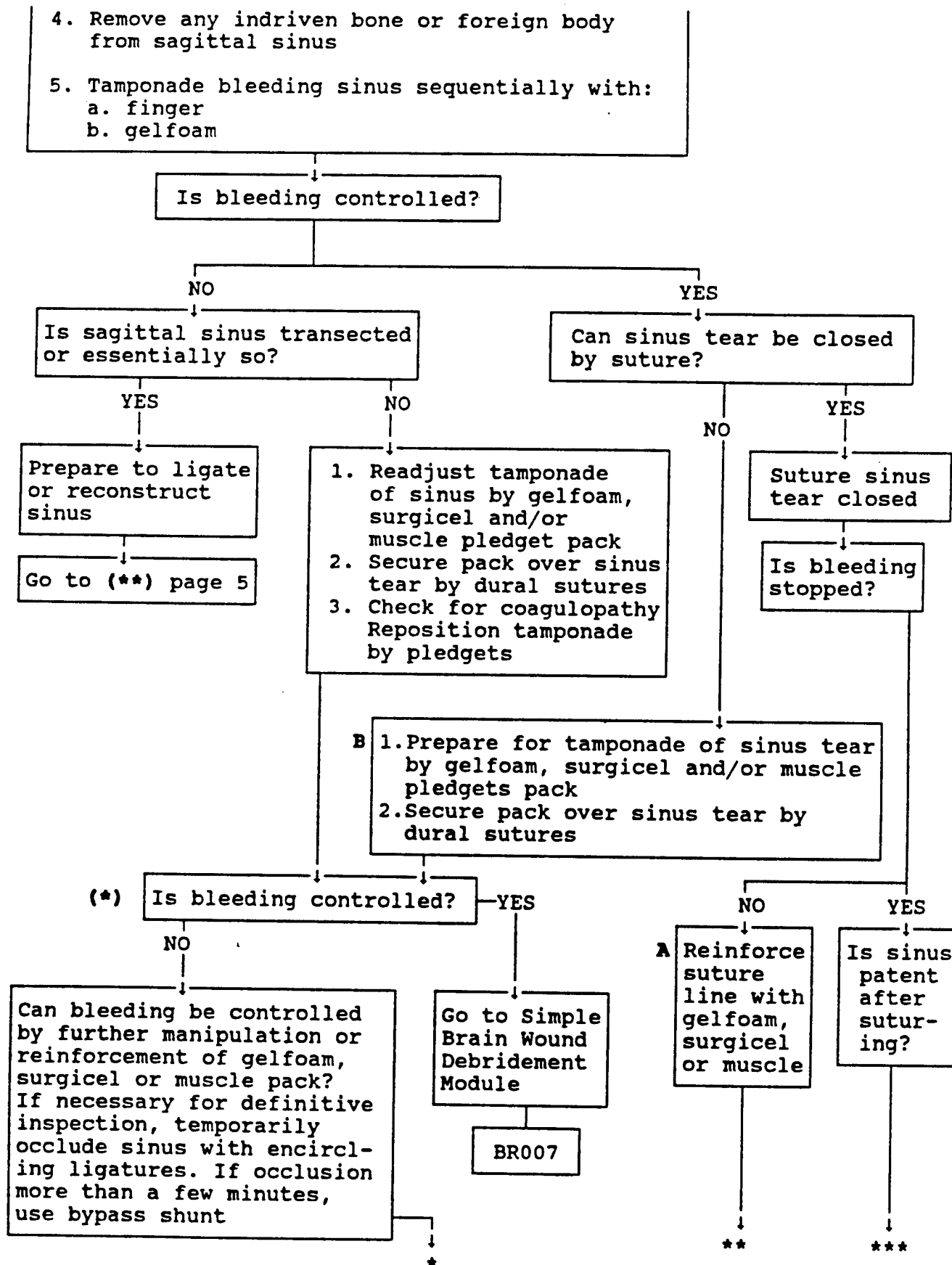
YES

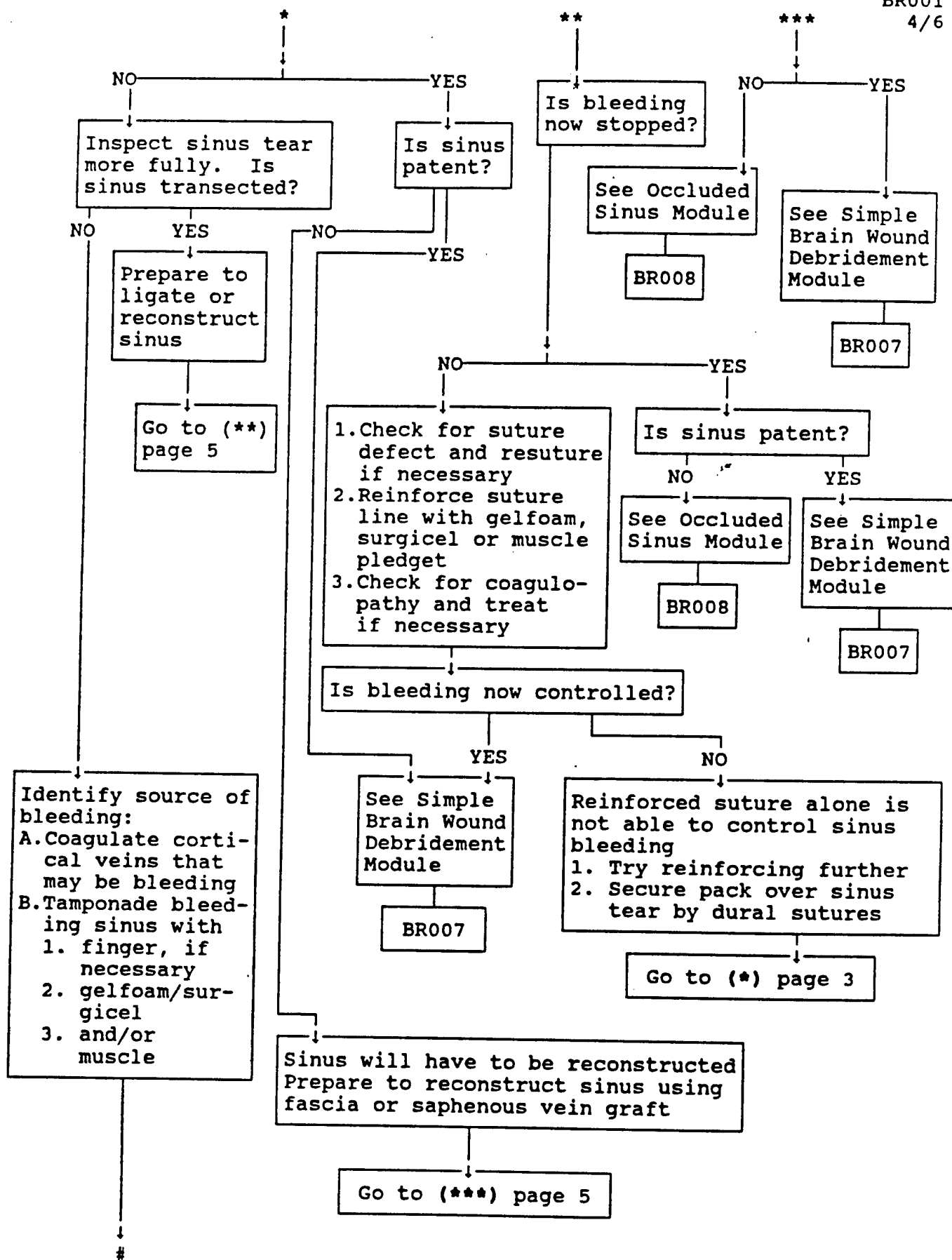
NO

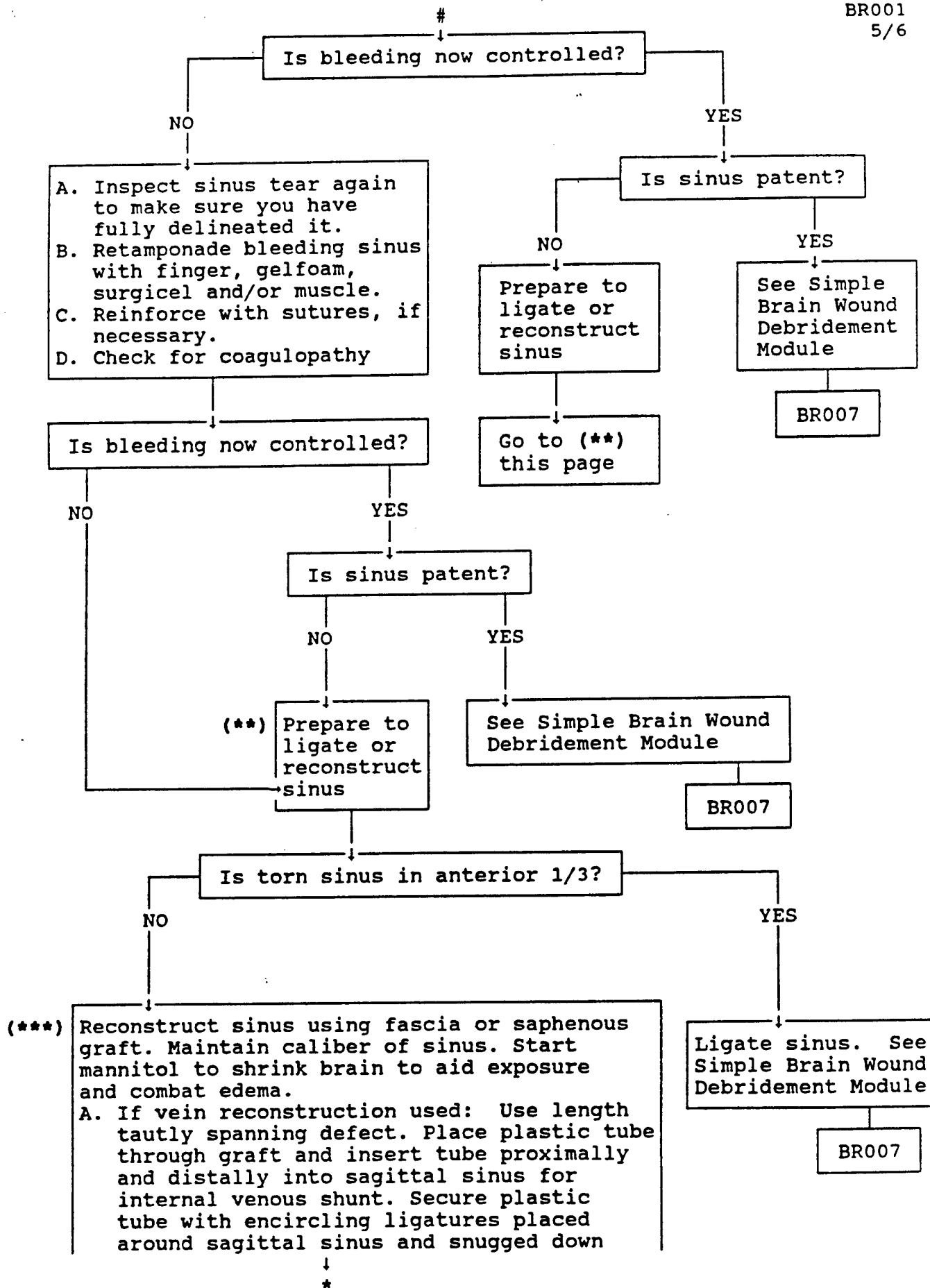
- Leave metal fragment, bone chips or other foreign body in bone wound over the sinus as tamponade
- Remove circumferential bone plate for immediate and adequate exposure of sagittal sinus, proximal and distal to sinus wound
- Have scrub nurse prepare a tamponade pad of large rectangle of gelfoam backed by a large pattie

Perform craniectomy keeping away from midline unless there is need to go in this region

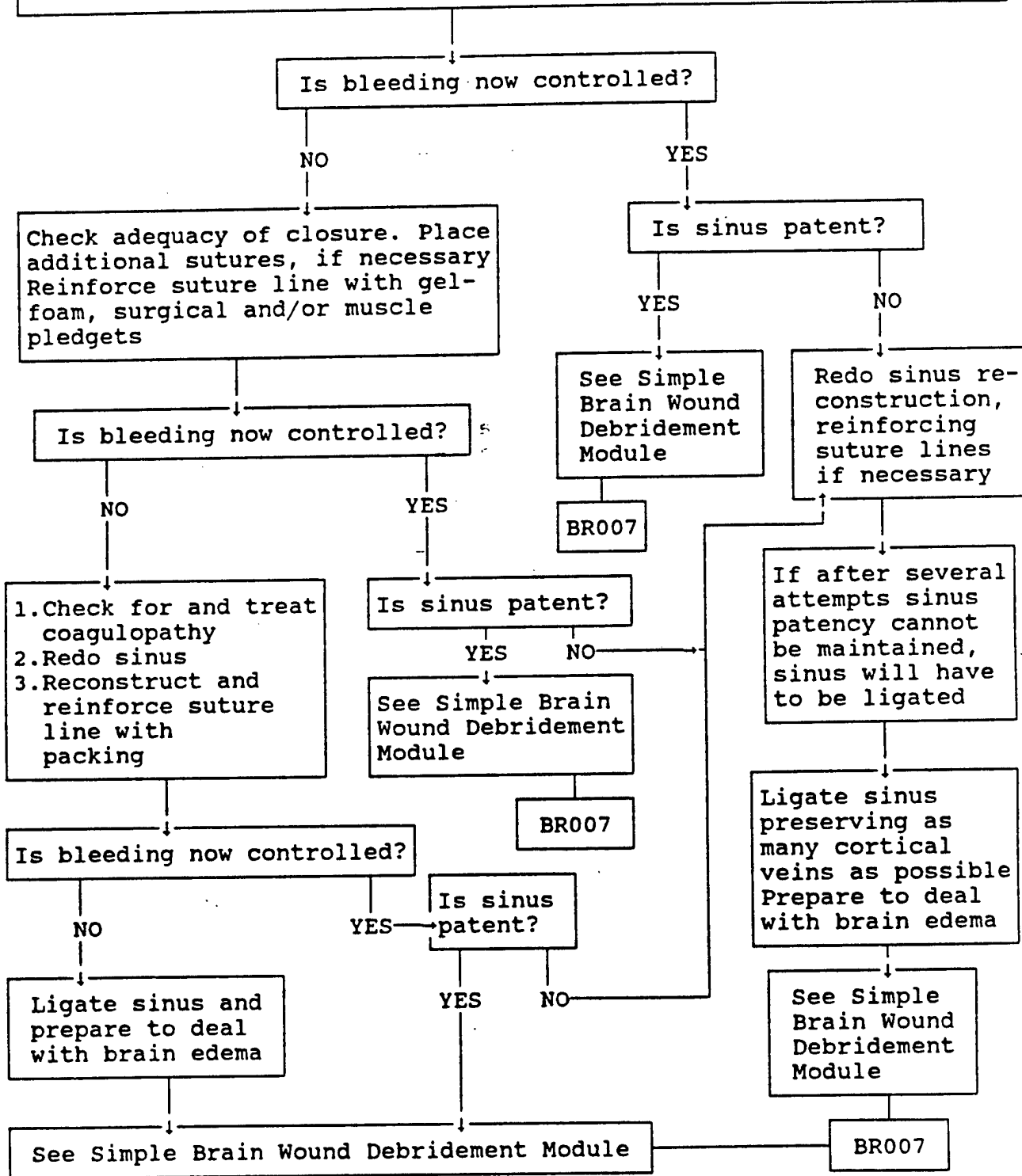
See Simple Brain Wound Debridement Module







onto plastic tube. Place proximal and distal stay sutures and perform edge to edge anastomosis between graft and sinus, proximally and distally. Before final superior portion of distal anastomosis closed, remove internal shunt and any thrombus. Finish anastomosis under heparinized saline wash to prevent air embolus.





BRAIN WOUND WITH VENOUS SINUS INJURY  
(TRANSVERSE SINUS) MODULE

Definitive assessment should be made of the anatomy of patient's transverse sinuses by angiogram, CT scan or X-ray before proceeding with module

Place patient in decubitus position. Turn head, if needed. Make sure there is no jugular vein compression or airway obstruction

Is wound likely to involve transverse sinus?

YES

Make skin incision so exposure can be gained proximal and distal to sinus injury and so bone removal can be made above and below transverse sinus

NO

Skin incision need not be planned to gain sinus exposure, but exposure must be wide enough to deal with the unexpected

Can anticipated skin incision be closed without tension?

NO

Create sliding scalp flap or plan relaxing incisions

1. sliding scalp flap: Place debrided scalp wound in one limb of scalp flap. Leave periosteum on skull under distal limb of scalp flap to aid subsequent skin grafting

2. Relaxing incision placed at a distance so "lazy S" incision incorporating debrided wound will close relaxing incision made at end of case during scalp closure

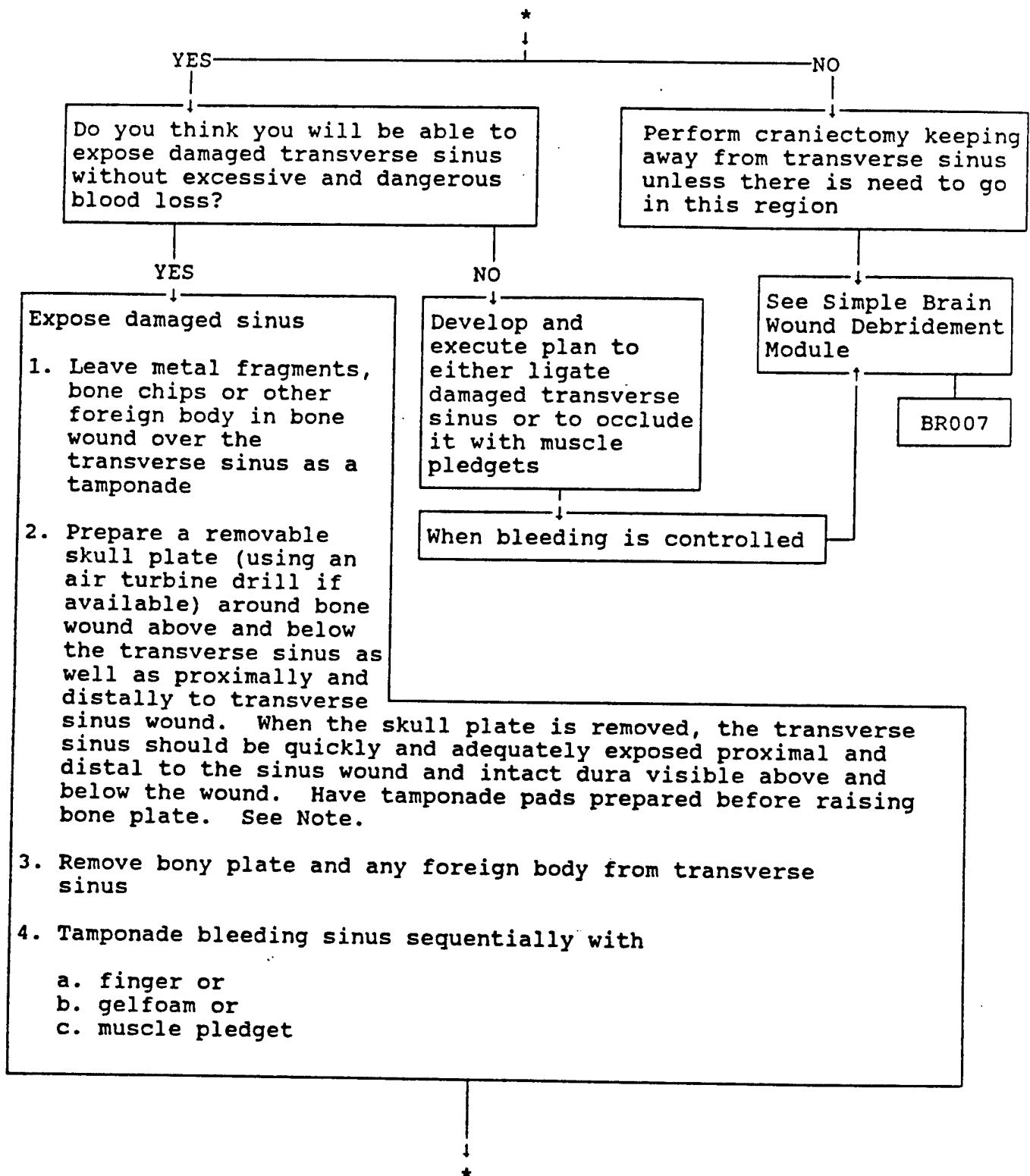
YES

Debride wound using an incision that will allow exposure above and below involved transverse sinus

With skull visualized do you still estimate that missile wound involves transverse sinus?

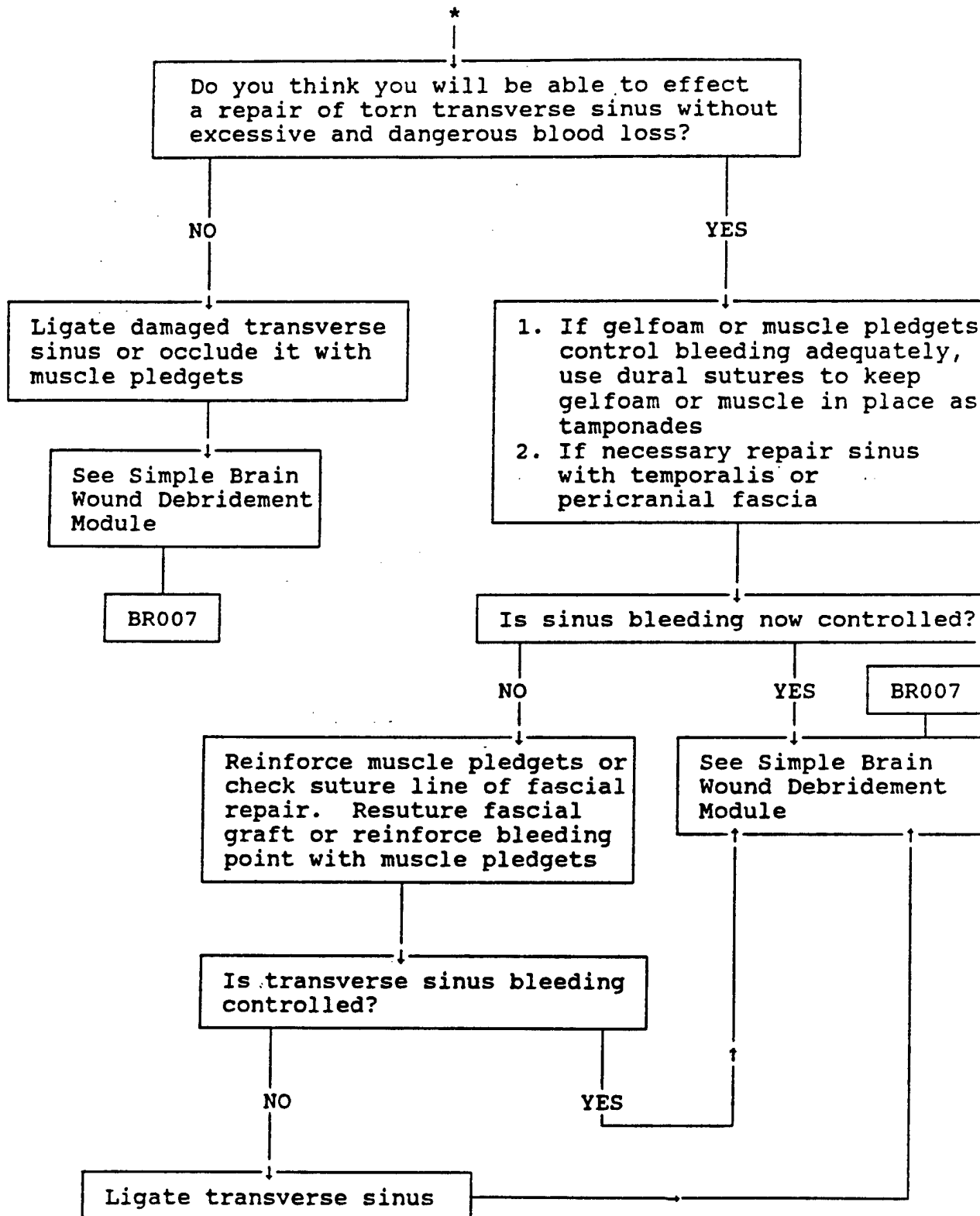
\*

BRAIN WOUND WITH VENOUS SINUS INJURY  
(TRANSVERSE SINUS)

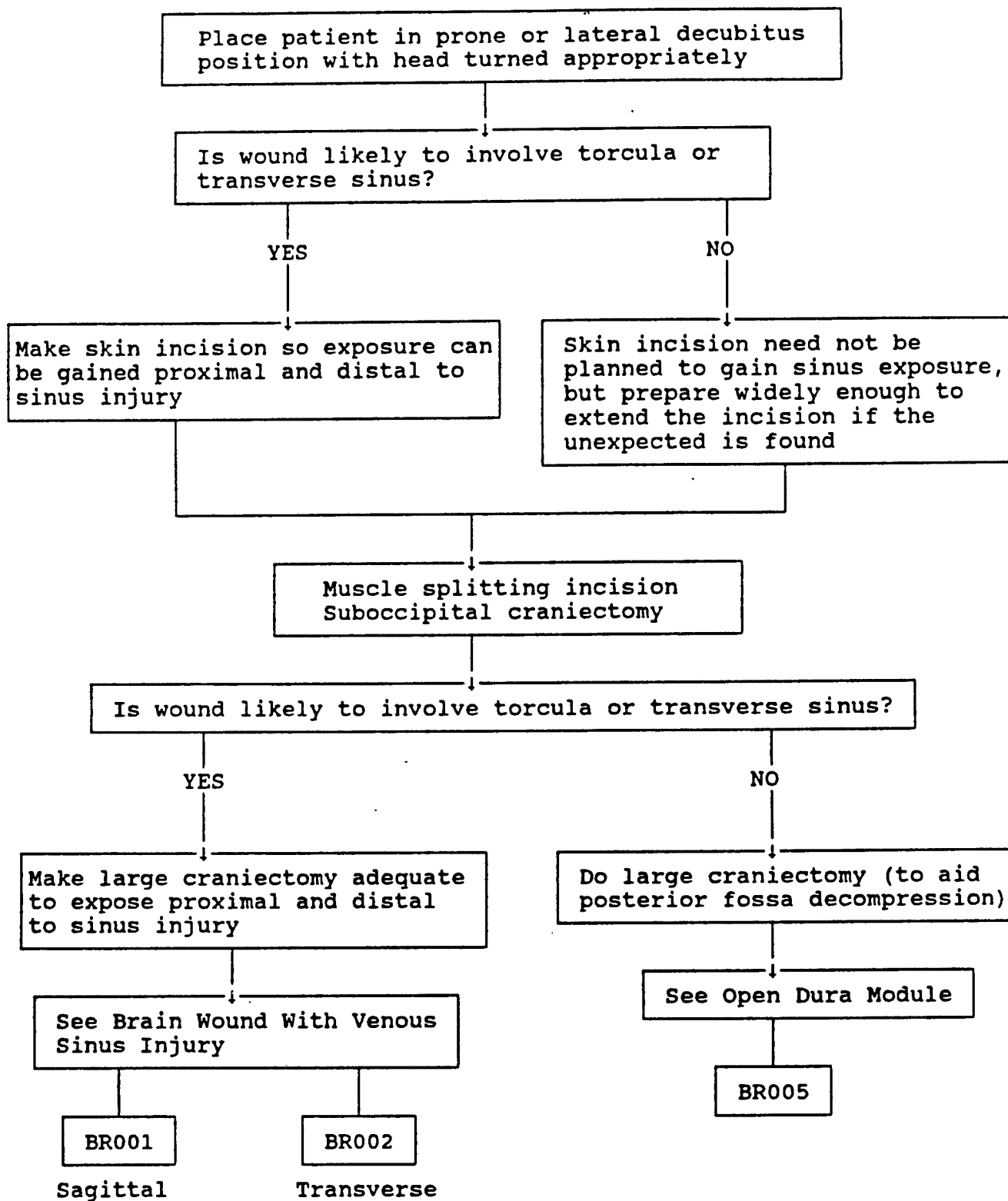


Note: See Brain Wound With Venous Sinus Injury (Sagittal Sinus) Module (BR001) for technique

BRAIN WOUND WITH VENOUS SINUS INJURY  
(TRANSVERSE SINUS)



CEREBELLAR WOUND MODULE



# FRONTAL SINUS WOUND MODULE

Definitive assessment of frontal sinus wound should be made by angiogram, CT scan or X-ray before proceeding with module

Frontal brain wound with obvious frontal sinus involvement  
Place patient supine on operating table and turn head if necessary

Associated severe eye damage?

YES

Enucleate eye by  
1. Preferably an ophthalmologist  
2. Neurosurgeon if no ophthalmologist available

NO

Is wound likely to involve sagittal sinus?

YES

Ligate sinus if not easily repaired

Monitor

NO

Scalp incision need not be made to gain exposure in region of sagittal sinus but prepare widely enough to extend incision if the unexpected occurs

When forehead wound is debrided could wound edges be approximated without tension?

YES

Expose frontal region either by  
1. Enlarging forehead wound  
or  
2. Soutar incision

Is forehead scalp wound large?

NO

\*

YES

\*\*

NO

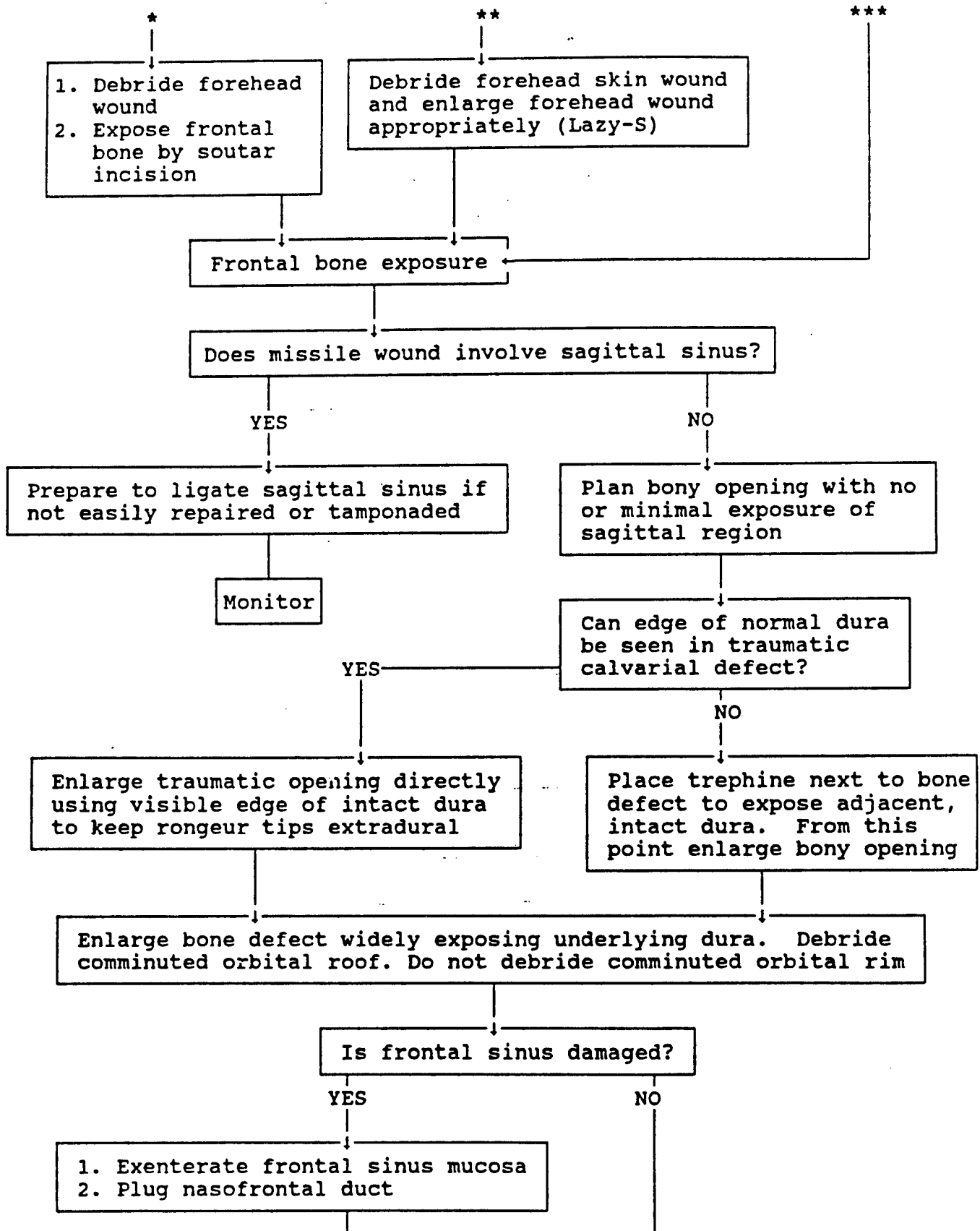
Create sliding scalp flap or plan to close forehead wound with aid of a relaxing incision

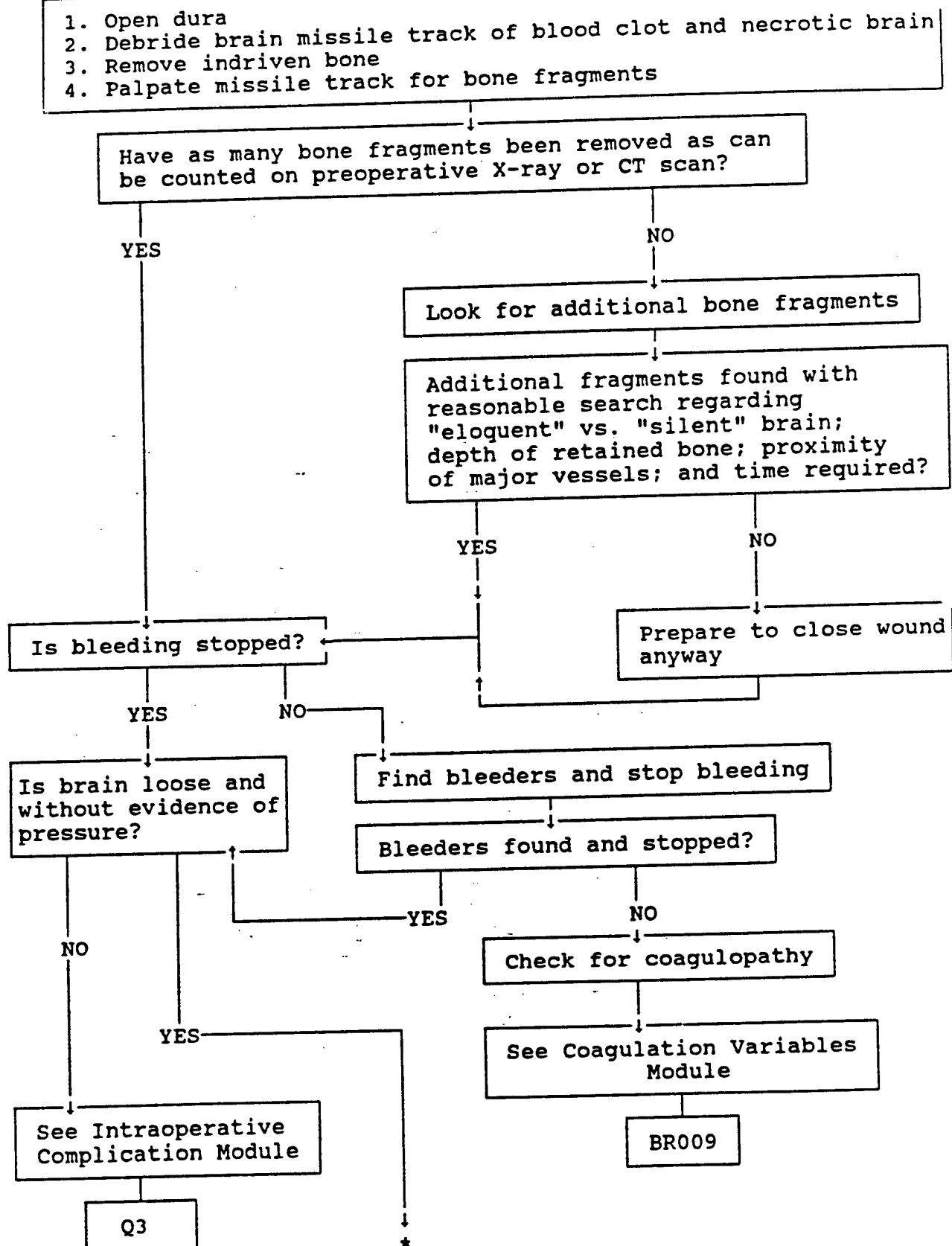
1. Sliding scalp flap: place debrided scalp wound in one limb of scalp flap. Leave periosteum on skull under distal limb of scalp flap to aid subsequent skin graft to skull
2. Relaxing incision: place at a distance so debrided forehead scalp wound can be closed without tension

\*\*\*

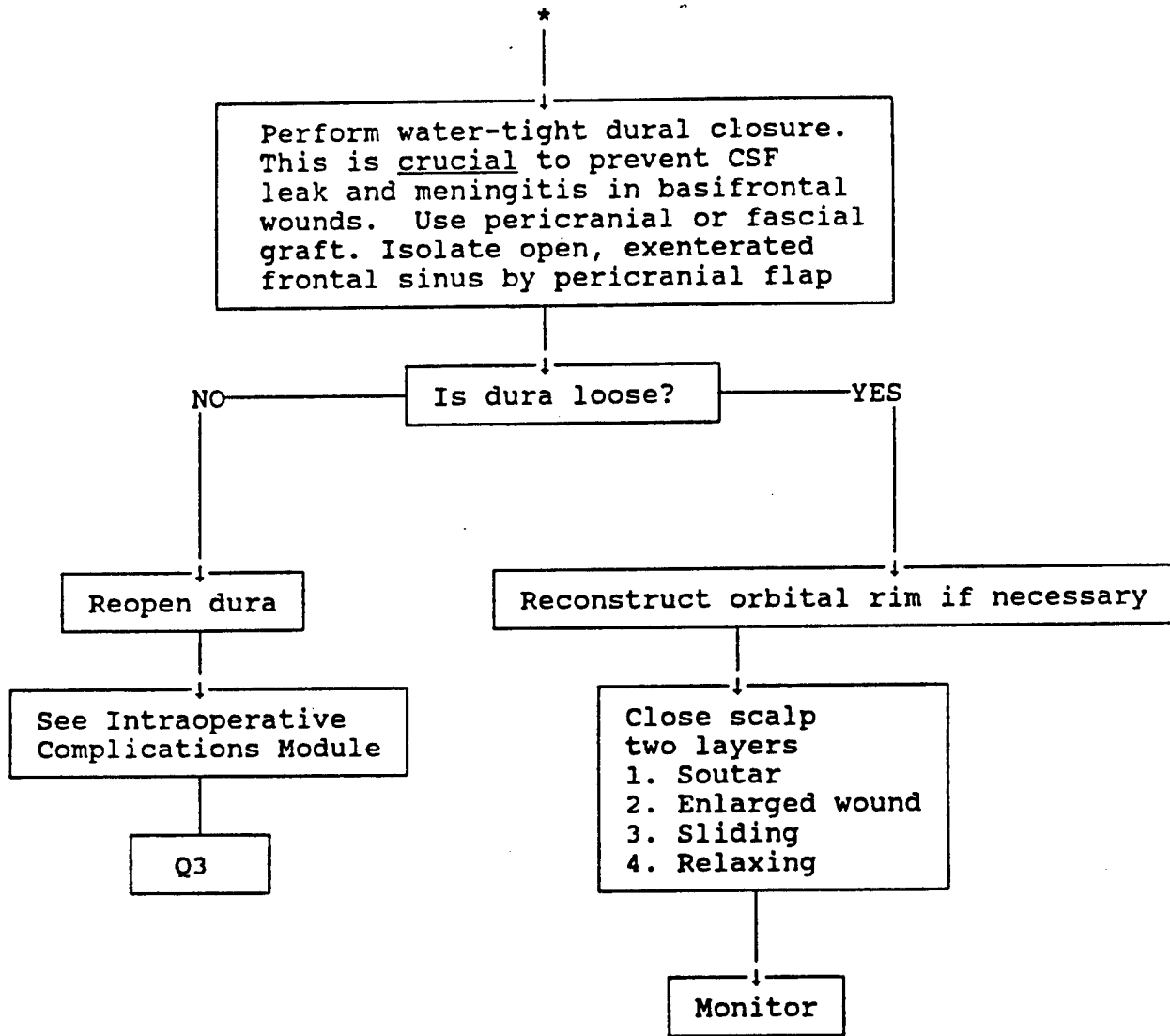
# FRONTAL SINUS WOUND

BR004  
2/4



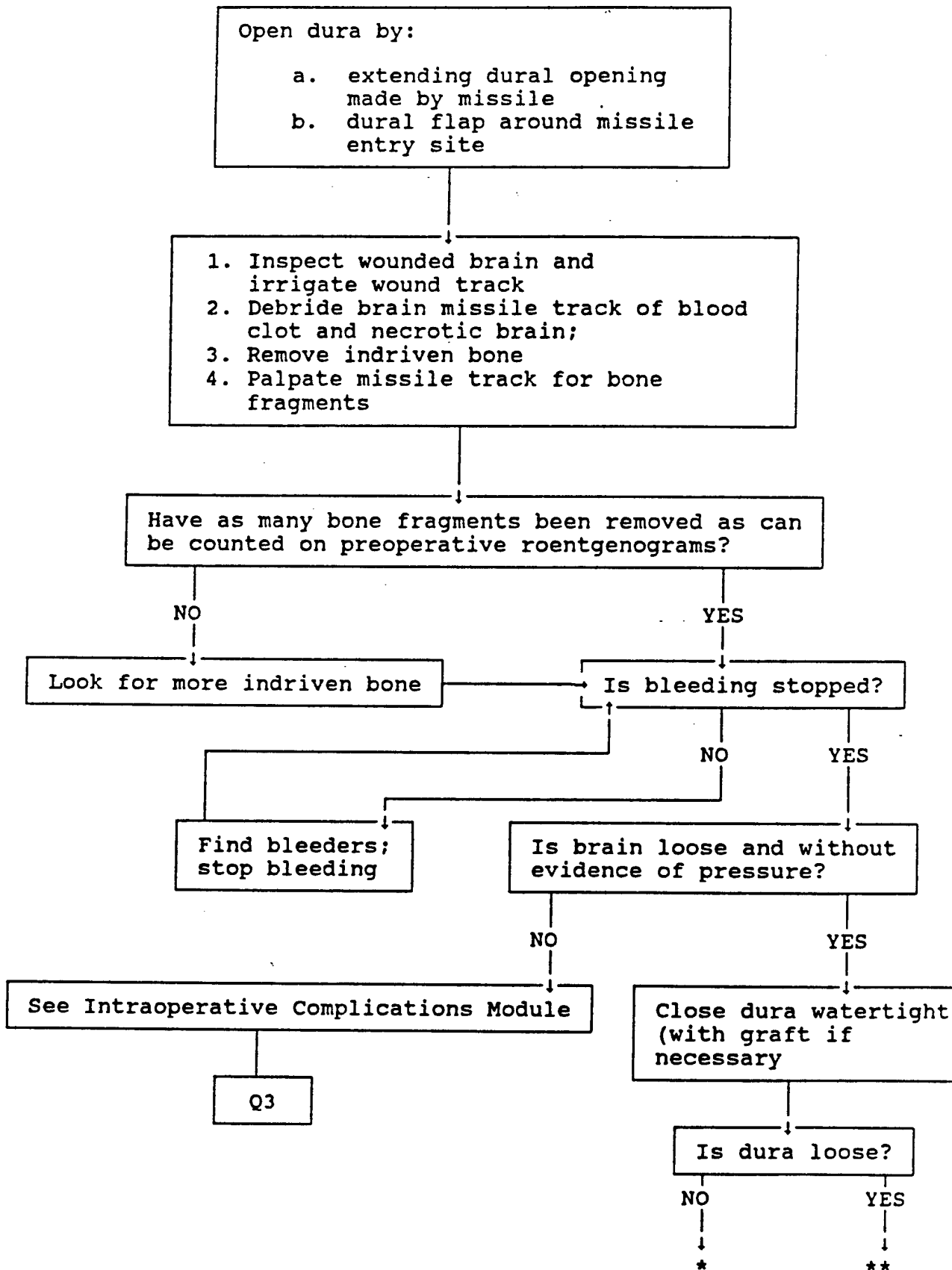


# FRONTAL SINUS WOUND

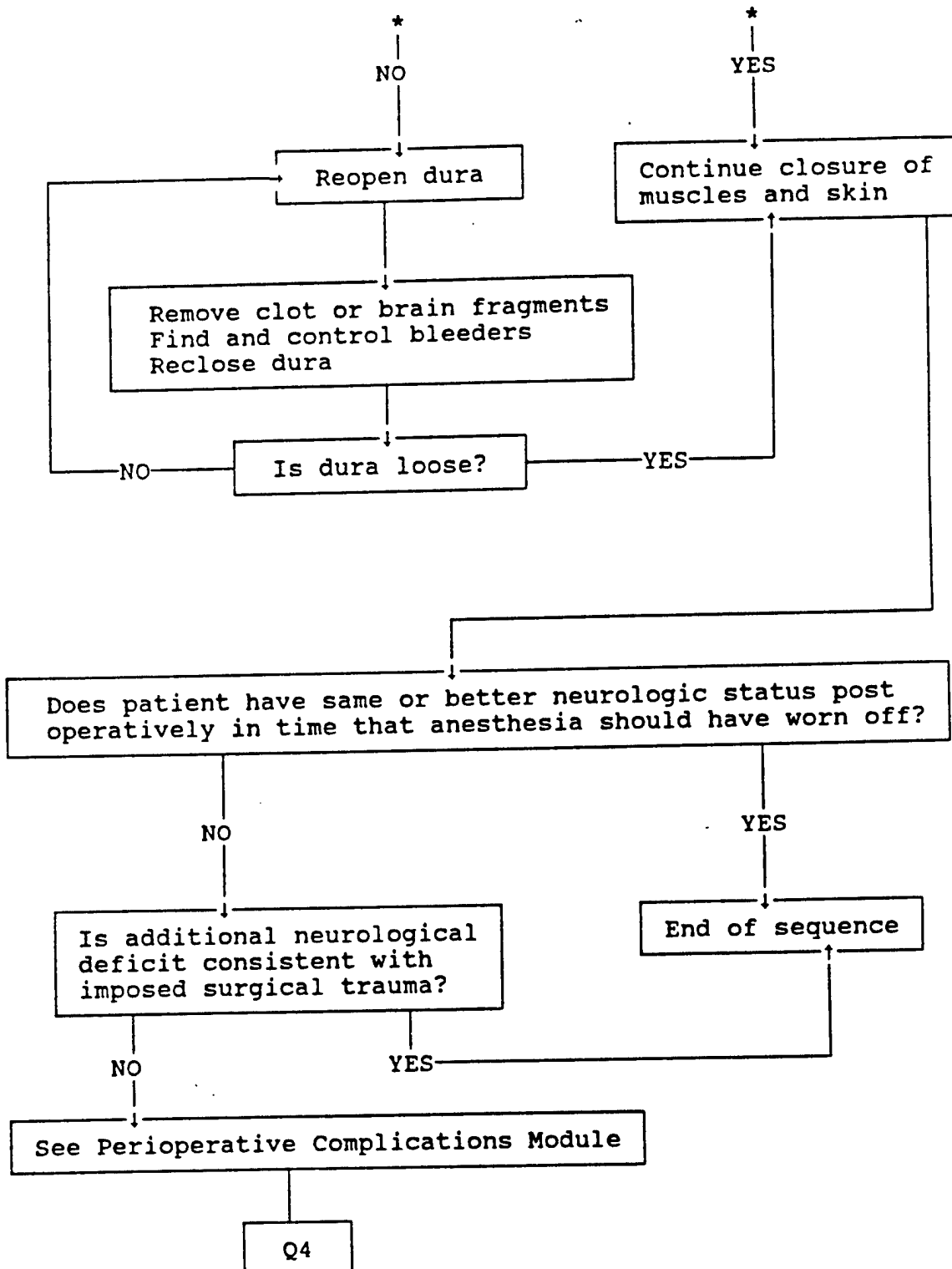




OPEN DURA MODULE



OPEN DURA MODULE



SIMPLE BRAIN WOUND MODULE

1. Place patient in position which gives optimal approach to wound and major intracranial structures which may also be involved (eg. venous sinuses)
  - a. supine with head elevated  $15^{\circ}$  -  $30^{\circ}$  above heart; turn head if necessary
  - b. lateral decubitus or "park bench" with head elevated  $15^{\circ}$  -  $30^{\circ}$  above heart
  - c. prone
  - d. avoid sitting position because of physiological stress it may place on a multiply-wounded patient. Also, anesthetist or anesthesiologist may not be experienced with this position
2. Design opening skin incision with an eye to closing it without any tension
  - a. If a horseshoe skin flap is made around the missile entry site, make sure that base will have adequate blood supply and that height of flap does not exceed 2-3 x base
  - b. If possible, avoid making a new incision in forehead (cosmetic considerations)
  - c. 2 layer closing: galea and skin

Is wound likely to involve a major venous sinus?

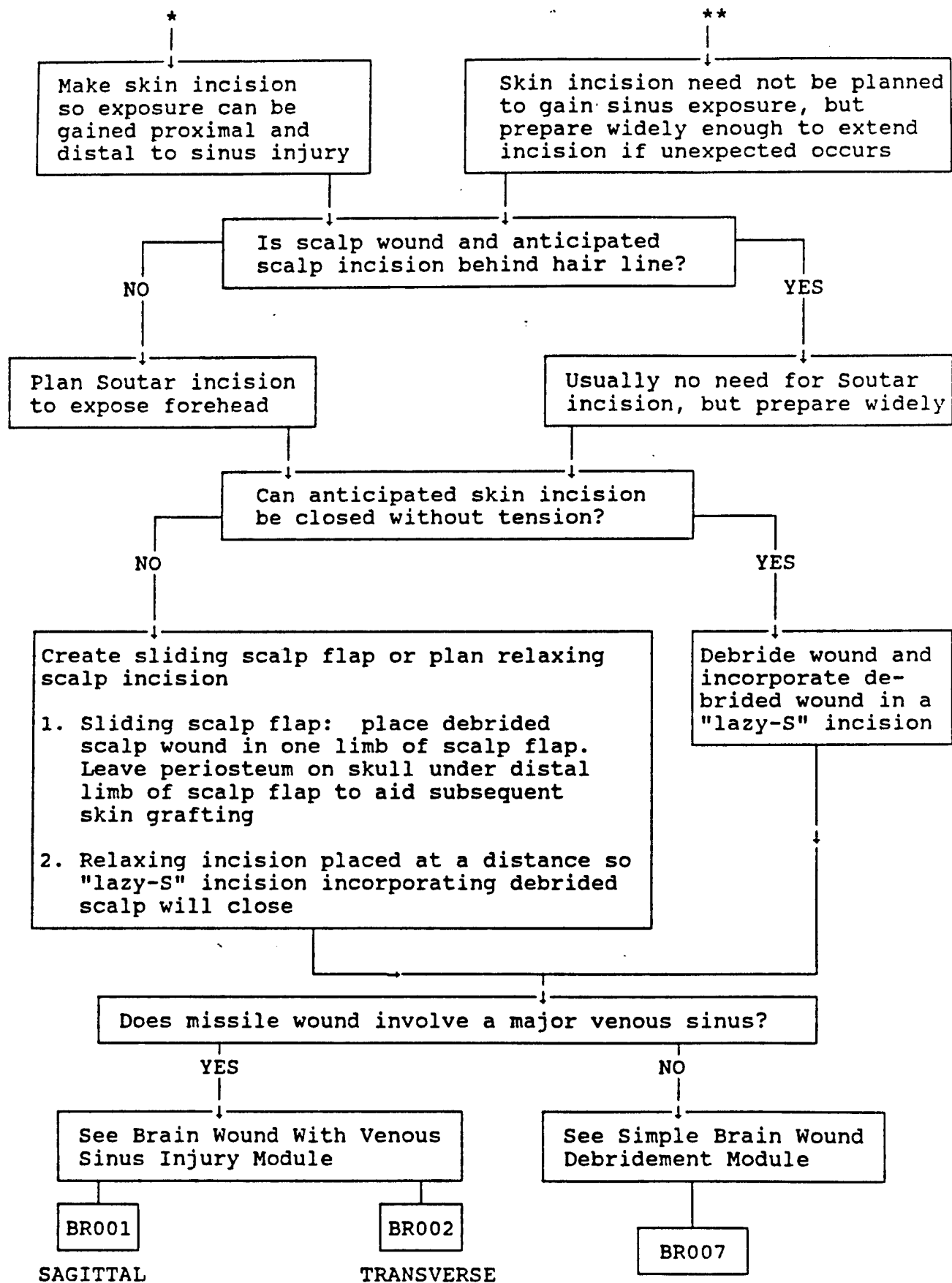
YES

↓  
★

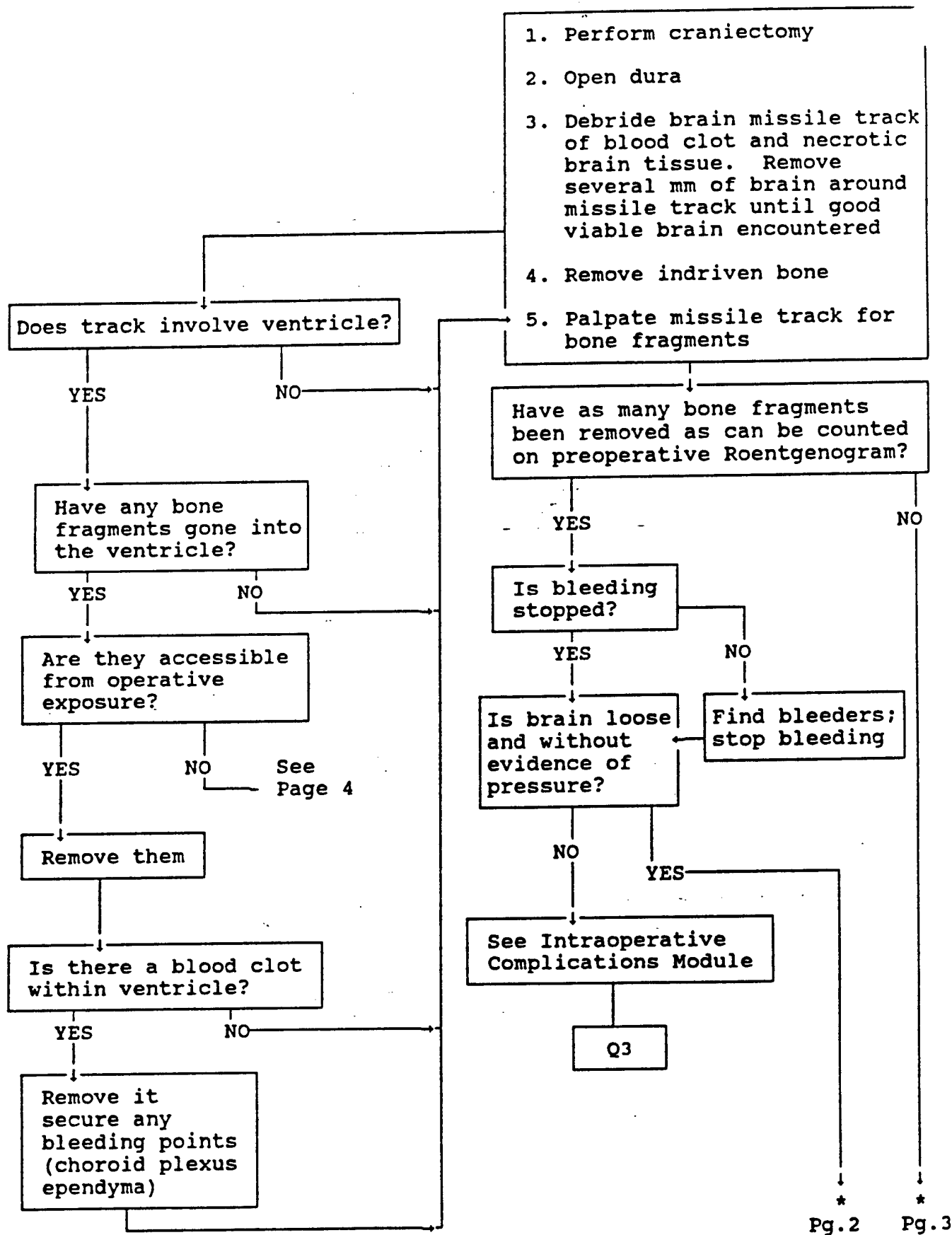
NO

↓  
★★

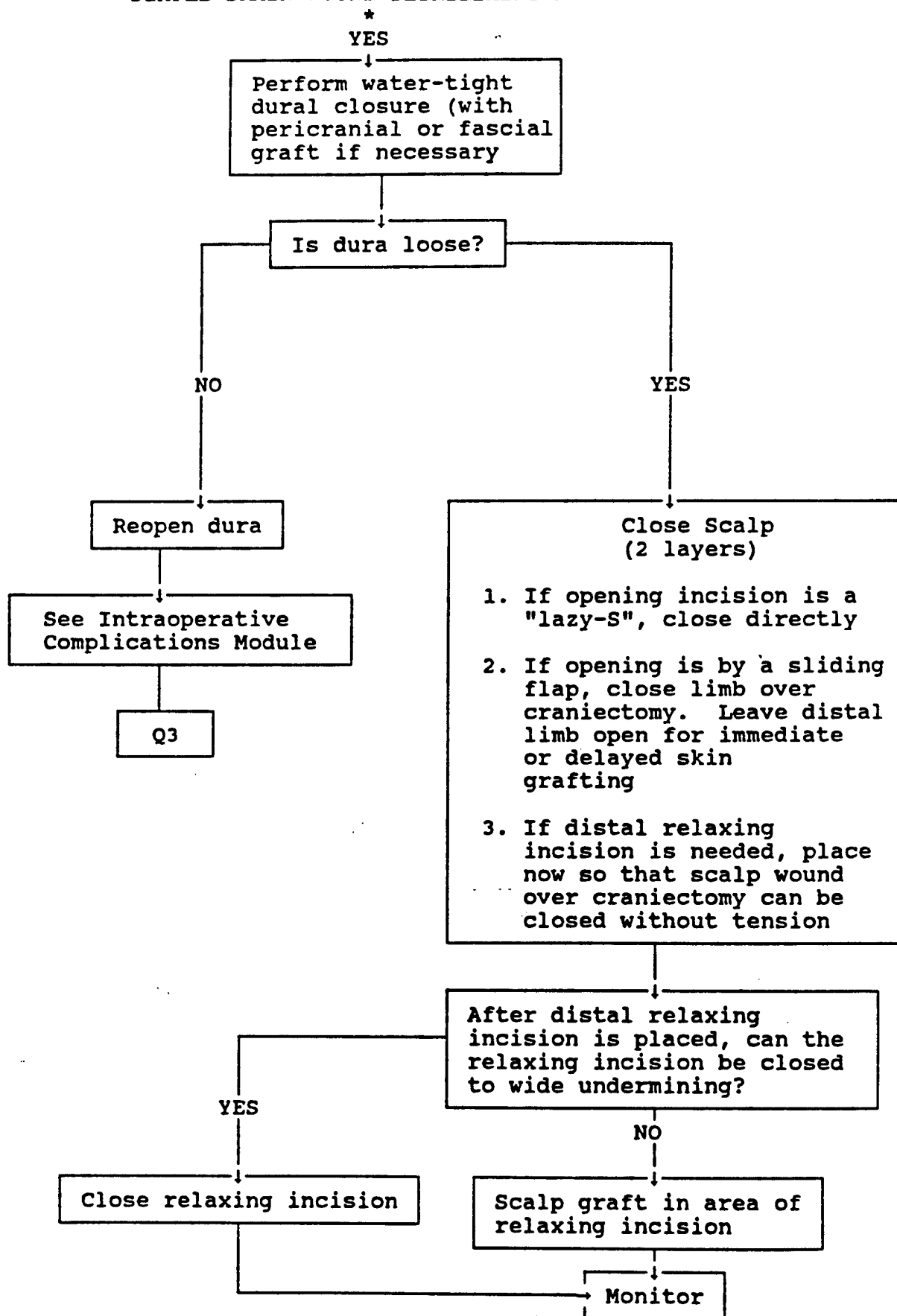
## SIMPLE BRAIN WOUND



SIMPLE BRAIN WOUND DEBRIDEMENT MODULE

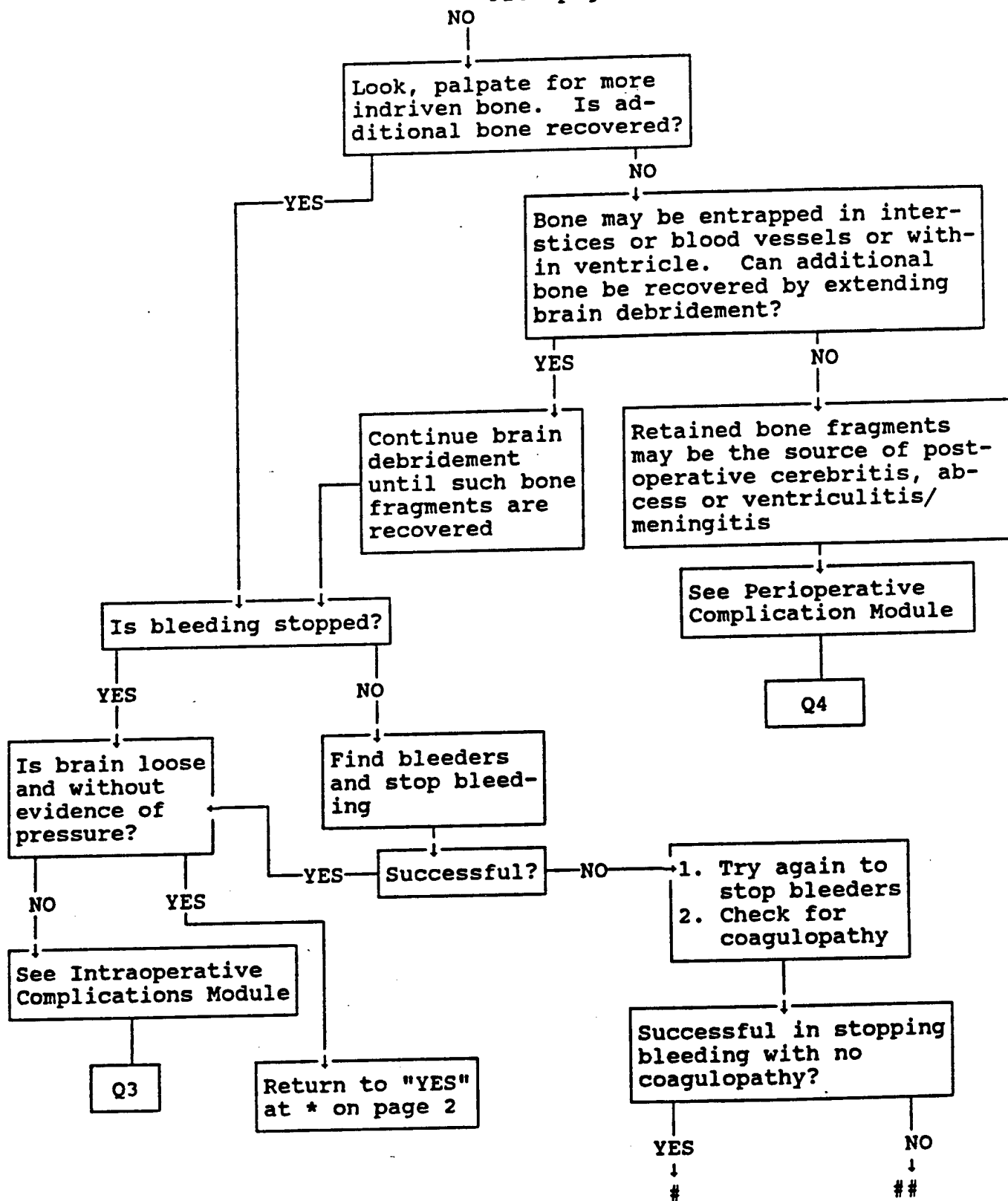


SIMPLE BRAIN WOUND DEBRIDEMENT MODULE



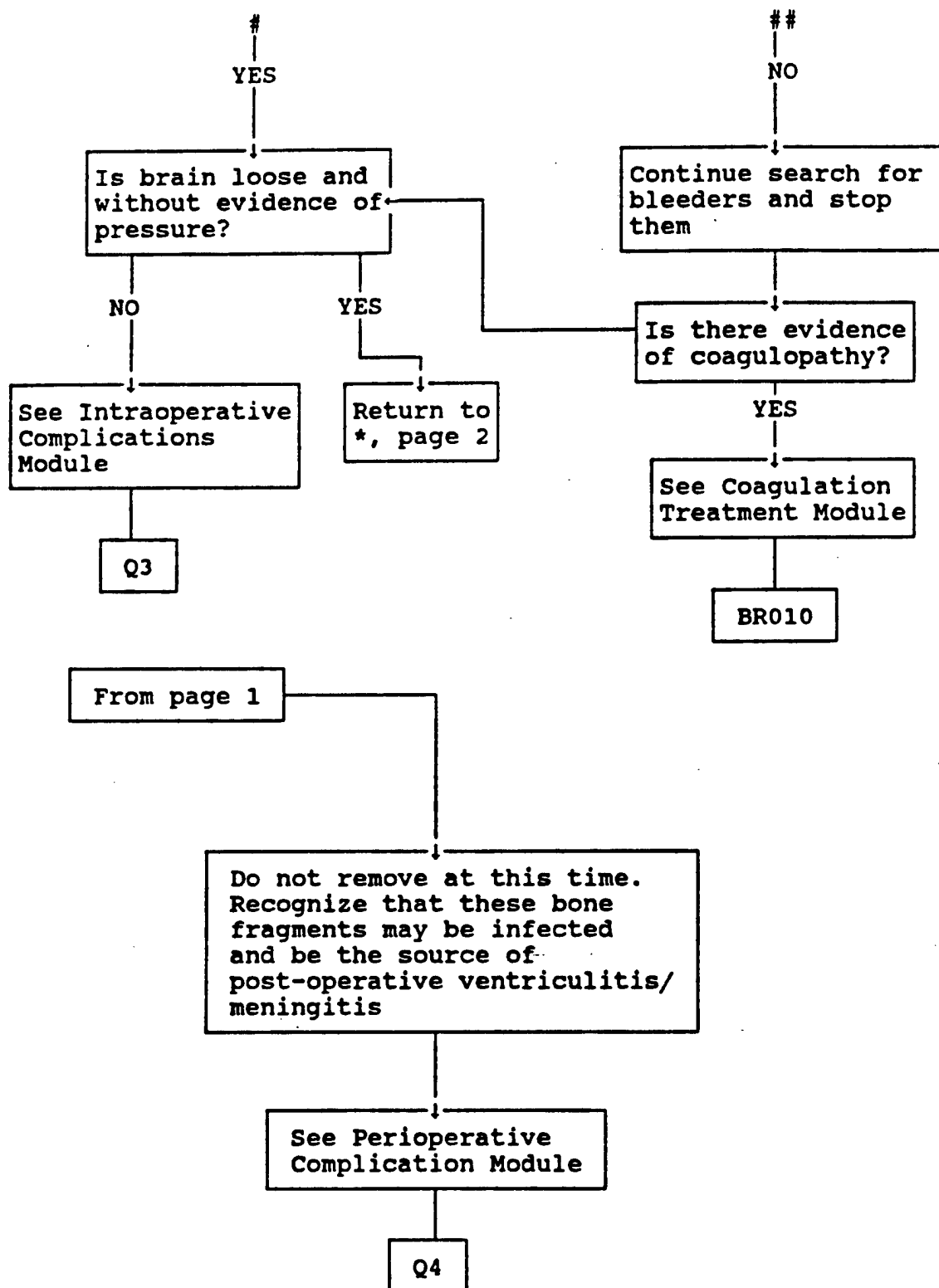
SIMPLE BRAIN WOUND DEBRIDEMENT MODULE  
\* From page 1

BR007  
3/1



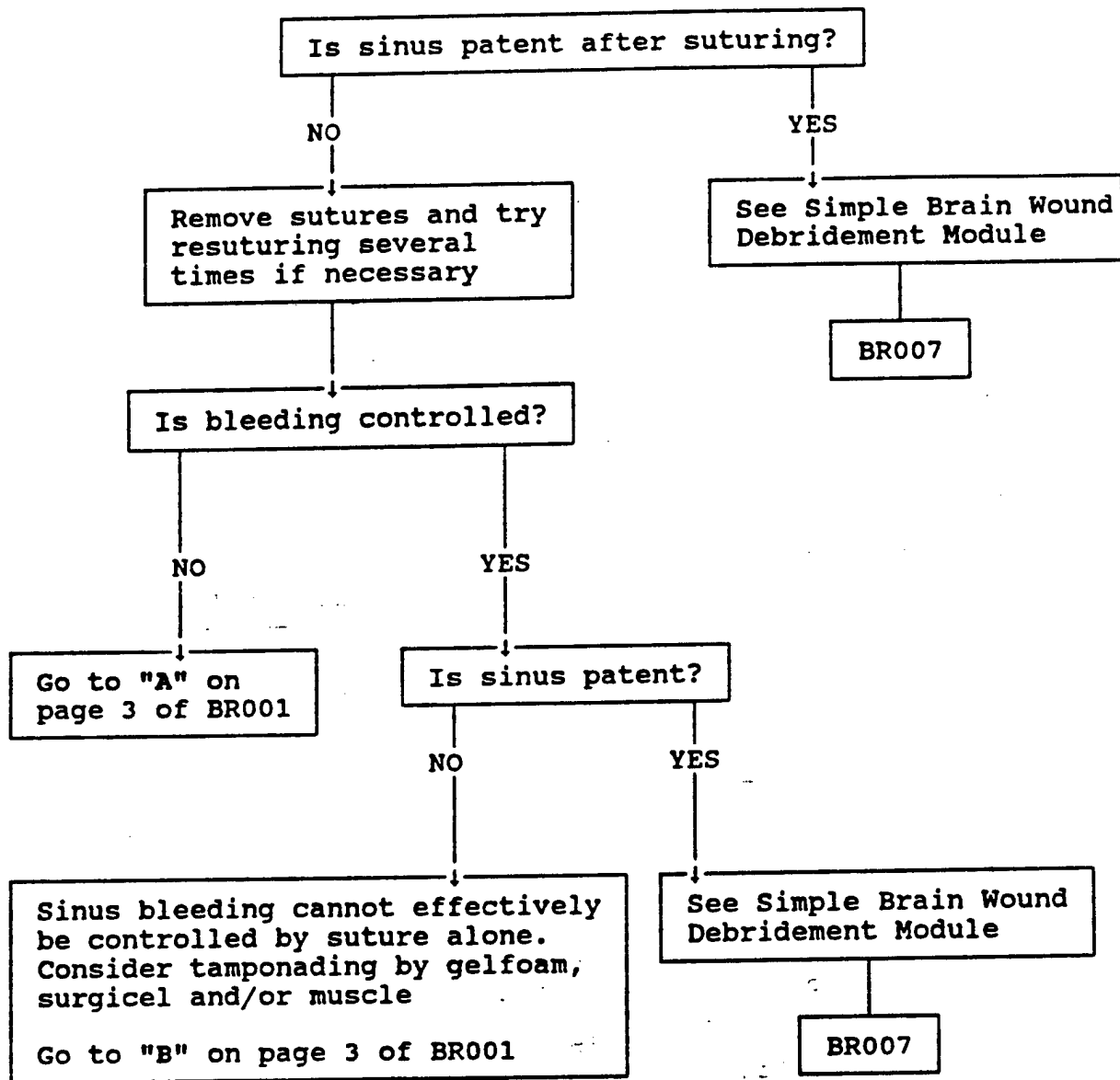
# SIMPLE BRAIN WOUND DEBRIDEMENT MODULE

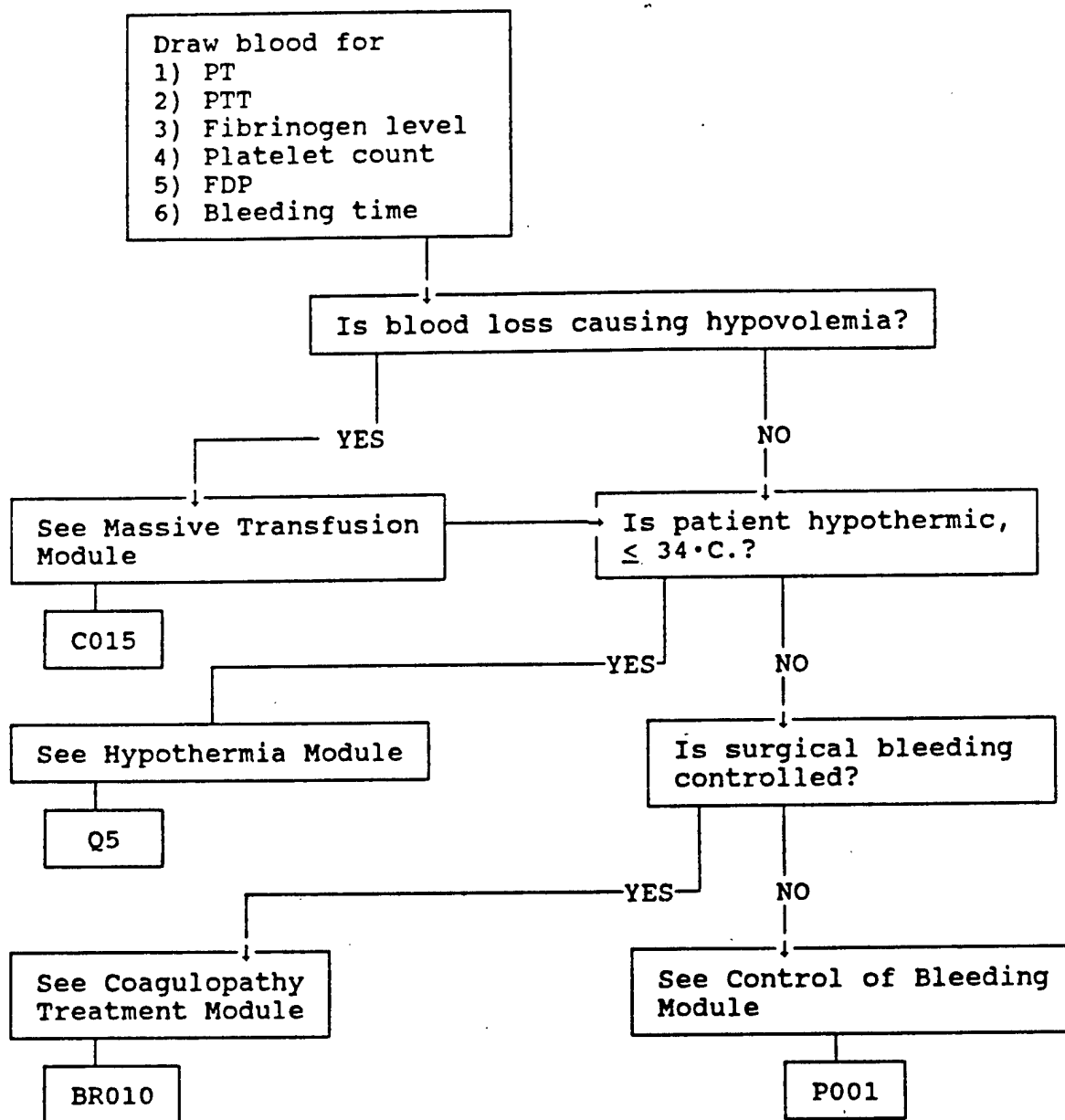
BR007  
4/4





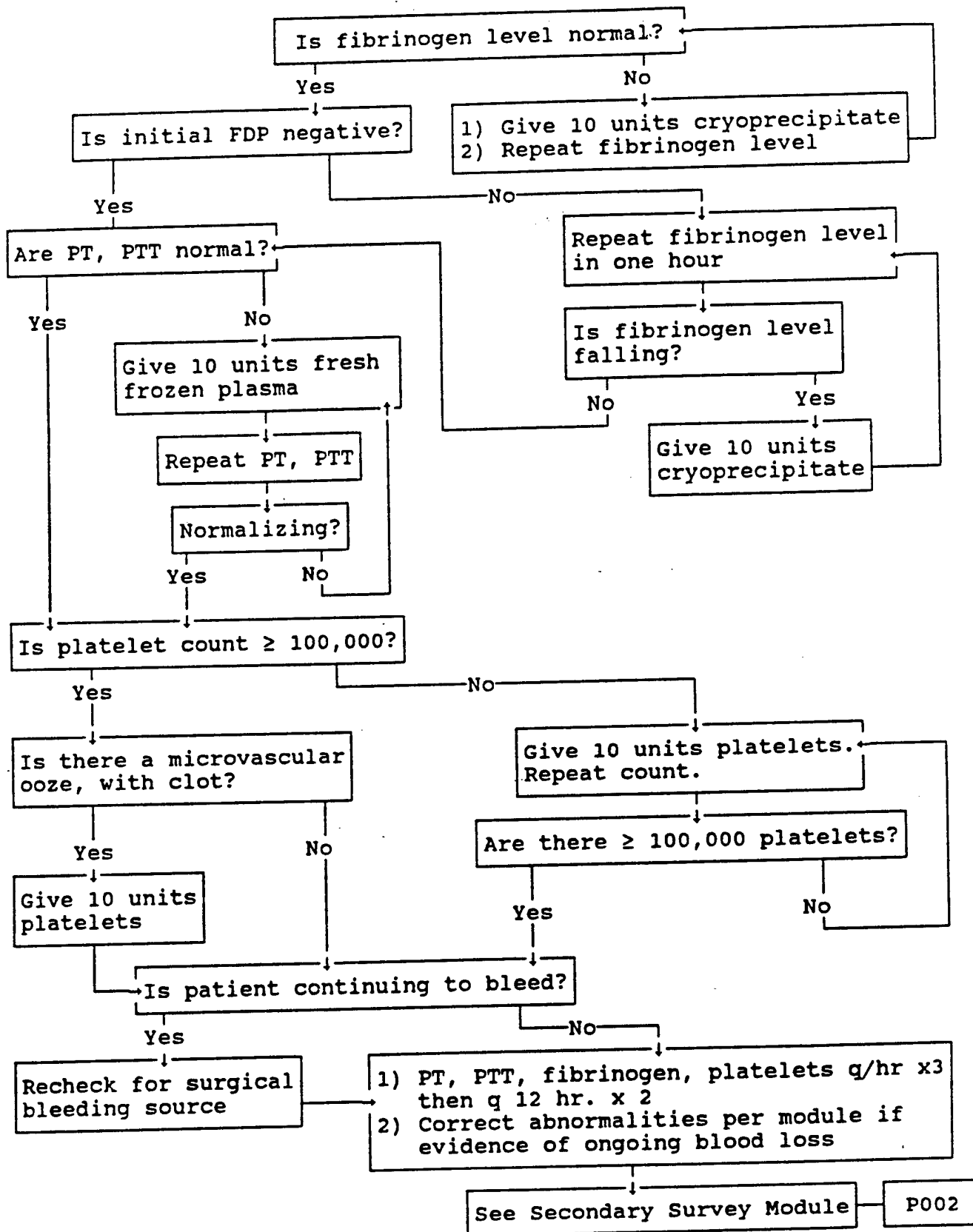
OCCLUDED SINUS MODULE



COAGULATION VARIABLES MODULE

# COAGULOPATHY TREATMENT MODULE

BR010  
1/1



10  
THORAX

War is nothing more than the continuation of politics  
by other means.  
[Karl Von Clausewitz: On War]

**A. Overview**

Chest injuries are responsible for many traumatic fatalities. These result from either disruption of the circulatory system or acute pulmonary compromise, both with a variety of etiologies. The major circulatory problems are hemorrhage and tamponade. Significant hemorrhage usually implies injury to the heart with pericardial disruption, or to the major vessels within the thoracic cage. Massive hemothorax and high volume chest tube bleeding are the hallmarks. Tamponade may present as shock, without the external evidence of hemorrhage and must be considered whenever thoracic or subxiphoid wounds are present.

Acute pulmonary compromise may result from disruption of the chest wall, tracheobronchial or pulmonary tissues, and manifest as pneumothorax or hemorrhage. Again, the chest tube can be both a therapeutic and a diagnostic tool in these cases. Continued bleeding and excessive air leak are the harbingers of potentially rapidly fatal injuries and should be aggressively evaluated.

Algorithms in this section focus on rapidly diagnosing severe cardiothoracic injuries in an effort to salvage these often moribund patients. As the modules progress, diagnosis leads to therapeutic maneuvers, choices and options. By determining and treating serious thoracic injuries, a significant number of fatalities can be avoided.

**B. Operation Desert Storm Case Reports**

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . .  
. . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . . , 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896

(619) 553-6896

(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]

#### C. Decision Trees

# THORAX - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - General Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Continue further efforts at clinicians's discretion	2*	3				
2. Perform left anterior thoracotomy	2*	3				Trauma chest tray; I.V. tubing; thoracotomy list
3. Open pericardium anterior to phrenic nerve	2*	3				Trauma chest tray; I.V. tubing
4. Open appendage. Insert filled large bore I.V. tubing	2*	3				Trauma chest tray; I.V. tubing
5. Place ligature around appendage, I.V.	2*	3				Trauma chest tray; I.V. tubing
6. Run fluid/blood as rapidly as possible			3	3	1*	Trauma chest tray; I.V. tubing
7. Open cardiac massage	2*	3				Standard drugs; syringe
8. Inject epinephrine 1:10,000 10 cc into aortic root	2*	3				Standard drugs; syringe
9. Give sodium bicarbonate into central I.V.	2*	3				Standard drugs; syringe
10. Continue massage	2*	3				
11. Counter shock with 10 to 50 watts	2*	3				Internal defibrillator paddles; standard drugs; syringe
12. Resume massage	2*	3				
13. Repeat epinephrine and correct acidosis	2*	3	3	3	1*	Standard drugs
14. Continue CPR	2*	3				
15. Check ABG's			3	3	1*	
16. Check K <sup>+</sup>			3	3	1*	

\*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

In all cases, a cardiac-thoracic surgeon represents optimal care. However, a general surgeon with extensive experience (indicated as 2\*) could perform many procedures. Also many of the modules call for the mobilization and utilization of a cardio-pulmonary by-pass team but have not been indicated in this listing. Point 176 calls for a cardiologist to administer and interpret an echocardiogram. A radiologist is optimal at point 30.

In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks.

Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

17. Correct ABG abnormalities and hyperkalemia			3		
18. Begin pressor			3		Standard drugs
19. Check pupils			3		
20. Evaluate pH and K <sup>+</sup>	2*	3			Laboratory equipment
21. Evaluate signs of pericardial tamponade	2*	3			
22. Prep anterior chest wall			3	3	1* Trauma chest tray; betadine
23. Drape area with sterile towel	2*	3	2	2	1* Sterile towels; laparotomy drape
24. Make incision over xiphoid	2*	3			Trauma chest tray
25. Pull up on xiphoid process and make tunnel to under surface of sternum; wipe anterior surface of pericardium with sterile gauze and hook Army-Navy retractor under sternum to visualize anterior - inferior edge of pericardium	2*	3			Trauma chest tray; Kocher clamp; Army-Navy retractors
26. Do immediate median sternotomy	2*	3			Sternal saw; Lebsche knife; median sternotomy list supply list
27. Grasp edge of diaphragm and pericardium with 2 Allis clamps	2*	3			Trauma chest tray
28. Make a vertical incision over anterior-inferior edge of pericardium	2*	3			Trauma chest tray
29. Subpectoral chest tube insertion	2*	3			Trauma chest tray
30. Esophageal swallow		Radiologist			X-ray capabilities
31. Median sternotomy incision	2*	3			Cardiovascular tray; chest set; median sternotomy supply list
32. Transsternal thoracotomy	2*	3			Trauma chest tray; (open heart pan 1, pan 2; sternal saw, Lebsche knife; Moarse retractor)
33. Extend pericardiotomy across top of diaphragm and proximally to innominate vein and marsupialize pericardium with 2-0 silk	2*	3			Trauma chest tray;
34. Expose pericardium	2*	3			Cardiovascular tray; chest set; median sternotomy supply list
35. Open pleural space and dissect between pleural spaces	2*	3			Cardiovascular tray; chest set; median sternotomy supply list



36. Do vertical pericardi- otomy	2*	3	Cardiovascular tray; chest set; median sternotomy supply list
37. Marsupialize peri- cardial edges	2*	3	Cardiovascular tray; chest set; median sternotomy supply list
38. Apply partial occlud- ing clamp under finger and repair injury	2*	3	Cardiovascular tray; chest set; median sternotomy supply list
39. Repair with pledgeted 4-0 suture	2*	3	Cardiovascular tray; chest set; median sternotomy supply list
40. Clamp aorta above-below injury and close with running suture	2*	3	Cardiovascular tray; chest set; median sternotomy supply list
41. Attempt medical stabili- zation	2*	3	
42. Perform aorto- innominate bypass		3	Sternal saw; Lebsche knife; trauma chest tray
43. Control proximal innominate artery and expose subclavian artery		3	Sternal saw; Lebsche knife; trauma chest tray
44. Oversew injury with pledgeted suture		3	Needle; suture
45. Clamp aorta proximal and distal to injury		3	Clamps
46. Mobilize aorta, tape aorta and divide peri- cardium		3	Sternal saw; Lebsche knife; trauma chest tray
47. Clamp artery distally; clamp origin onto aorta and repair		3	Clamps; 4-0 monofilament suture
48. Perform carotid to carotid or carotid to subclavian bypass		3	Sternal saw; Lebsche knife; trauma chest tray
49. Apply clamp and repair aorta with pledgeted monofilament sutures		3	Clamps; monofilament suture
50. Clamp aorta distal to innominate artery and repair with running suture		3	Clamps; sutures
51. Complete pneumonectomy	2*	3	Cardiovascular tray; chest set; mediansternotomy supply list
52. Perform lobectomy	2*	3	Cardiovascular tray; chest set; mediansternotomy supply list; thoracic list
53. Reevaluate pulmonary venous bleeding	2*	3	
54. Cauterize edge of pericardium	2*	3	Median sternotomy list

55. Suture pericardial edge	2*	3			Median sternotomy list
56. Open pleural space	2*	3			Median sternotomy list
57. Cauterize; suture pericardial surface	2*	3			Suture; cautery
58. Control simple holes or tears in atrium or ventricles	2*	3			Vascular clamp; Foley catheter; 3/0 monofilament pledgeted sutures
59. Cover holes with fingers and repair with horizontal pledgeted mattress sutures of 2-0 prolene	2*	3			Pledgeted mattress 2-0 prolene sutures
60. Repair with purse string sutures	2*	3			3-0 prolene sutures
61. Defibrillate with pediatric paddles	2*	3	2	2	1* Internal defibrillator paddles; standard to run eqpt. drugs; syringe; machine off sterile field
62. Place purse string suture and make stab incision	2*	3			Median sternotomy list
63. Infuse packed cells			3	3	1* Packed cells
64. Set defibrillator			3	3	1* Internal defibrillator paddles; standard drugs; to run eqpt. syringe; machine off sterile field
65. Place paddles and initiate discharge	2*	3			
66. Lidocaine if not already initiated			3	1*	1 Lidocaine
67. Check arterial blood gas			3	3	1* Laboratory equipment
68. Clamp appropriate structures	2*	3			Cardiovascular tray; chest set; median sternotomy supply list
69. Ligate artery above and below injury		3			Cardiovascular tray; chest set; median sternotomy supply list
70. Attempt repair with inflow occlusion		3			Cardiovascular tray; chest set; median sternotomy supply list
71. Palpate over cardiac injury	2*	3			Monitoring eqpt.; EKG; Arterial pressure; Swan Ganz catheter eqpt.
72. Arrhythmia management	2*	3			Monitoring eqpt.; EKG; Arterial pressure; Swan Ganz catheter eqpt.
73. Compress hole/tear in right atrium	2*	3			Cardiovascular tray; chest set; median sternotomy supply list
74. Control injury with finger pressure	2*	3			
75. Apply occluding clamp to larger hole/tear	2*	3			Cardiovascular tray; chest set; median sternotomy supply list
76. Close hole with purse string suture	2*	3			4-0 purse string suture

77. Close tear with running suture	2*	3	4-0 running prolene suture
78. Place partial occluding clamp to control wound	2*	3	Cardiovascular tray; chest set; median sternotomy supply list; Statinsky clamp
79. Clamp SVC above and below wound, dissect and replace with occluding clamp		3	Cardiovascular tray; chest set; median sternotomy supply list
80. Harvest pericardium for patch and suture		3	Cardiovascular tray; chest set; median sternotomy supply list; 4-0 monofilament suture
81. Suture wound		3	4-0 monofilament permanent suture
82. Suture wound and repeat with pledgeted suture	2*	3	4-0 monofilament suture; 4-0 pledgeted interrupted suture
83. Open right atrial appendage after placing 3-0 purse string		3	Cardiovascular tray; chest set; median sternotomy supply list
84. Insert #40 chest tube		3	Cardiovascular tray; chest set; median sternotomy supply list
85. Place tourniquets		3	Tourniquets
86. Close with 4-0 permanent monofilament sutures		3	4-0 permanent monofilament sutures
87. Cut pericardial patch and close with running 4-0 monofilament sutures		3	Cardiovascular tray; chest set; median sternotomy supply list
88. Open abdomen		3	Cardiovascular tray; chest set; median sternotomy supply list
89. Control IVC below diaphragm		3	Cardiovascular tray; chest set; median sternotomy supply list
90. Apply partial occluding clamp		3	Cardiovascular tray; chest set; median sternotomy supply list; Statinsky clamp
91. Fibrillate heart with DC fibrillation and repair with suture		3	DC fibrillation eqpt; 4-0 suture
92. Clamp vein; split pericardium and repair with 4-0 monofilament		3	Cardiovascular tray; chest set; median sternotomy supply list; 4-0 monofilament
93. Immediate right anterior thoracotomy	2*	3	Thoracotomy list
94. Right pericardiotomy	2*	3	Thoracotomy list
95. Evacuate clot	2*	3	Thoracotomy list
96. Occlude hilum and replace with vascular clamp	2*	3	Thoracotomy list
97. Explore hilum	2*	3	Thoracotomy list

98. Open pericardium anterior to phrenic nerve and isolate pulmonary artery	2*	3	Thoracotomy list
99. Open pericardium anterior to phrenic nerve and control proximal artery	2*	3	Thoracotomy list; Cardiovascular tray
100. Reclamp artery	2*	3	Clamp
101. Repair bronchus	2*	3	Thoracotomy list
102. Control pulmonary artery at hilum	2*	3	Thoracotomy list
103. Control bronchus	2*	3	Thoracotomy list
104. Control pulmonary veins	2*	3	Thoracotomy list
105. Proceed with pneumonectomy	2*	3	Thoracotomy list
106. Open pericardium for proximal control	2*	3	Thoracotomy list
107. Repair bronchus with absorbable suture		3	Thoracotomy list
108. Ligate artery distal to middle lobe	2*	3	Thoracotomy list
109. Perform right lower lobectomy	2*	3	Thoracotomy list
110. Perform right middle lower lobectomy	2*	3	Thoracotomy list
111. Ligate, perform apical anterior segmentectomy or right upper lobectomy		3	Thoracotomy list
112. Repair artery with monofilament suture		3	Thoracotomy list
113. Proceed with right upper lobectomy, segmental or wedge resection of devascularized lung	2*	3	Thoracotomy list
114. Control right middle lobe blood supply	2*	3	Thoracotomy list
115. Control right middle lobe bronchus	2*	3	Thoracotomy list
116. Proceed with right middle lobectomy	2*	3	Thoracotomy list
117. Control arterial supply and bronchus	2*	3	Thoracotomy list

118. Control hilar vessels, 2\* 3  
oversew venous bleeders  
and examine arterial  
supply
119. Isolate area of injury, 2\* 3  
debride and close wound
120. Place pressure over 2\* 3  
site with stick sponge
121. Apply side occlusion 2\* 3  
clamp
122. Repair with non- 2\* 3  
absorbable monofilament  
suture
123. Isolate cava with 2\* 3  
tapes, open pericardium  
and control azygous vein
124. Close back wall from 2\* 3  
inside and close outer  
wall
125. Patch with pericardium 2\* 3  
or dacron
126. Close with non-absorb- 2\* 3  
able monofilament suture
127. Immediate left 2\* 3  
anterior thoracotomy
128. Make an incision paral- 2\* 3  
tel and anterior to the  
phrenic nerve and  
suspend pericardium  
with 3-0 silk
129. Evacuate clot 2\* 3
130. Control bleeding with 2\* 3  
finger or pack
131. Repair artery end - end; 2\* 3  
heparinized shunt  
optional
132. Control bleeding and 2\* 3  
place clamps above and  
below injury
133. Primary repair of 2\* 3  
injury.
134. Occlude hilum with 2\* 3  
manual traction  
en-bloc and place  
large vascular clamp  
across hilum
135. Open pericardium and 2\* 3  
isolate left pulmonary  
artery

Thoracic list

Thoracic list

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracic list; cardiovascular tray

Thoracotomy list

Thoracotomy list

Thoracotomy list

Thoracotomy list; thoracic aneurysm set; open  
heart Pan 1-2; cardiovascular tray; chest set

Thoracotomy list; thoracic aneurysm set; open  
heart Pan 1-2; cardiovascular tray; chest set

Thoracotomy list; thoracic aneurysm set; open  
heart Pan 1-2; cardiovascular tray; chest set

Thoracotomy list; thoracic aneurysm set; open  
heart Pan 1-2; cardiovascular tray; chest set

Thoracotomy list

Thoracotomy list

136. Control pulmonary artery proximal to injury	2*	3	Thoracotomy list; cardiovascular tray
137. Ligate artery distal to lingular segment	2*	3	Thoracotomy list; cardiovascular tray
138. Perform left lower lobectomy	2*	3	Thoracotomy list; cardiovascular tray
139. Ligate arteries and perform segmentectomy or lobectomy	2*	3	Thoracotomy list; cardiovascular tray
140. Repair bronchus with absorbable sutures	2*	3	Thoracotomy list; cardiovascular tray
141. Control arterial bleeding	2*	3	Thoracotomy list
142. Proceed with wedge or segmental resection or upper left lobectomy	2*	3	Thoracotomy list
143. Perform left upper lobectomy	2*	3	Thoracotomy list
144. Repair bronchus with absorbable monofilament	2*	3	Thoracotomy list
145. Control arterial supply	2*	3	Thoracotomy list
146. Control lower lobe bronchus	2*	3	Thoracotomy list
147. Proceed with left lower lobectomy	3	3	Thoracotomy list
148. Pack the apex of the chest, position patient for median sternotomy, control innominate origin and extend incision	2*	3	Thoracotomy list; mediansternotomy list; cardiovascular tray
149. Control proximal left subclavian artery at aortic arch and distal to injury	2*	3	Thoracotomy list; mediansternotomy list; cardiovascular tray
150. Interposition graft for repair of artery	2*	3	Thoracotomy list; mediansternotomy list; cardiovascular tray
151. End to end anastomosis for repair of artery	2*	3	Thoracotomy list; mediansternotomy list; cardiovascular tray
152. Ligate arterial bleeding proximal and distal to injury	2*	3	Thoracotomy tray
153. Ligate mammary artery proximal and distal to injury	2*	3	Thoracotomy tray

154. Ligate venous bleeding. Azygous vein may be ligated	2*	3			Thoracotomy tray
155. Ligate arterial vessel	2*	3			Thoracotomy tray
156. Oversee area of bleeding	2*	3			Thoracotomy tray
157. Repair diaphragm with permanent suture	2*	3			Thoracotomy tray
158. Repair appropriate chest injury	2*	3			Thoracotomy list
159. Close esophageal injury with layer (single/double) technique	2*	3			Thoracotomy tray
160. Open mediastinal pleura widely	2*	3			Thoracotomy tray
161. Apply chest tube drainage and give antibiotics	2*	3			Thoracotomy tray
162. Ligate esophagus below injury with umbilical tape or heavy stitch	2*	3			Thoracotomy tray
163. Tube pharyngostomy or cervical esophageal diversion	2*	3			Thoracotomy tray
164. Tube gastrostomy, feeding enterostomy	2*	3			Thoracotomy tray
165. TPN or enteral feeding	2*	3			Thoracotomy tray
166. Attempt repair with mobilization of trachea, debridement	2*	3			Thoracotomy tray
167. Trachea ventilated with double lumen, or sterile tube	2*	3			Thoracotomy tray
168. Repair with absorbable monofilament suture	2*	3			Thoracotomy tray
169. Cover suture line with pleural patch, muscle flap or pericardial flap	2*	3			Thoracotomy tray
170. Attempt bronchoplastic repair of upper lobe bronchus	2*	3			Thoracotomy tray
171. Bolus 100 mg lidocaine and begin lidocaine drip 2 mg/min			3	3	1 Lidocaine
172. Measure cardiac enzymes			3	3	1* Monitoring equipment

173. Serial EKG		3	3	1*	Monitoring equipment
174. Swan-Ganz monitor		3			Swan-Ganz catheter and monitor
175. Arterial line		3			Tubing; monitor with pressure capability; pressure bag; heparin
176. Echo cardiogram	Cardiologist				Electrocardiography capability
177. Serial cardiac enzymes		3	3	1*	Monitoring equipment
178. O <sub>2</sub>		3	3	1*	O <sub>2</sub> source and monitor
179. Maintain minimal fluid intake to keep urine > 50 cc/M <sup>2</sup> /hr	2* 3	2	2	1*	Fluid intake monitor
180. Minimize fluid replacement to keep urine > 50 cc/M <sup>2</sup> /hr		2	2	1*	Fluid intake monitor
181. Intraoperative PEEP as tolerated		2	2	1*	Positive end expiratory pressure monitor
182. Ear oximetry		3	3	1*	
183. Hold PEEP until blood pressure stable		2	2	1*	
184. Urine output monitored		2	2	1*	Fluid output monitor
185. Serial blood gases or ear oximetry		3	3	1*	Serial blood gas monitor
186. Respiratory care		3	3	1*	
187. Ventilator		3	3	1*	Ventilator; O <sub>2</sub> source



CARDIO VASCULAR TRAY

BOTTOM LAYER

-----  
#7 KNIFE HANDLE  
STRULLY SCISSOR  
POTTS SCISSORS - 25, 45, 60 DEG  
NARROW TIP SUTURE SCISSOR

SECOND LAYER

-----  
30 DEG PERIPHERAL CL (BLACK)  
ACUTE ANG MINATURE CLAMPS  
STR ATRAGRIP CLAMPS  
30 DEG DEBAKEY MINATURE CLAMPS  
LONG ALLISES

THIRD LAYER

-----  
LONG ATRAGRIP TISSUE FCPS  
MED ATRAGRIP TISSUE FCPS  
SH ATRAGRIP TISSUE FCPS  
LONG FINE TIPPED N.R.  
MED N.R.  
SH FINE TIPPED N.R.

FOURTH LAYER

-----  
TANGENTIAL OCCLUSION CL (LG ANG  
SATINSKY)  
SEMB CLAMP  
KIDNEY PEDICLE CLAMP

CHEST SET (THORACIC) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARHALT  
REGULAR CARHALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
MEDIUM NEEDLE HOLDERS  
LONG NEEDLE HOLDER -NOT FINE  
SPONGE STICKS  
LONG CURVES  
LAUERS  
TONSILS  
ROCKERS - CLAMP  
BABCOCK CLAMP  
ALLIS CLAMP  
CURVED CRILER  
CURVED MOSQUITOES CLAMP  
SUTURE SCISSORS  
MAYO SCISSORS  
METZ SCISSORS  
LONG METZ SCISSORS

CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATTRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
TONSILS  
MEEKER  
KIDNEY PEDICAL CLAMP  
REGULAR RUMELS  
REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR  
FEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES  
#3 LONG KNIFE HANDLE

EXTRA LONG INSTRUMENTS

CONTENTS

---

EXTRA LONG NEEDLE HOLDER  
EXTRA LONG FINE NEEDLE HOLDER  
EXTRA LONG CURVES  
REGULAR RUMEL  
MEEYERS  
BRIDGE FORCEPS  
EXTRA LONG ALLISES  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB WITHOUT TEETH  
LONG BABCOCKS  
EXTRA LONG METZ

# LAPAROTOMY EQUIPMENT LIST A

## SUTURE

SILK 2-0 STRAND  
SILK 3-0 STRAND

## STICK TIES

SILK 2-0 SH  
SILK 3-0 SH

## CLOSURE

VICRYL 0 CT  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES SM-35W

## DRAPES & PACKS

MAJ. BASIN/GRADUATE W/  
MED. CUP 60CC  
LAPAROTOMY SHEET  
BACK TABLE COVER  
TOWELS, STERILE (6)  
MAYO STAND COVER  
GOWN, STERILE XIR. LRG. (3)  
SKIN PREP TRAY  
MEDIUM SHEET 44 X 60"

## SPONGES

LAP. 18 X 18 (3)  
4 X 4 X-RAY DETECT  
CYLINDRICAL DISSECTOR'S

## CAUTERY

GROUNDING PAD  
ELECTRO-CAUTERY HAND PENCIL  
CAUTERY MACHINE  
CAUTERY EXTENTION BLADE

## CATHETER

CATH. PLUG  
FOLEY CATH. TRAY  
FOLEY CATH. 16FR. THERMAL  
URIMETER DRAINAGE BAG

## GLOVES

EXAM, UNSTERILE  
SURGEONS, STERILE  
SURGEONS HYPO-ALLERG., STERILE

## SOLUTIONS

IRRIG. WATER 1500CC  
IRRIG. NACL 1000CC

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
BLADE, SURGICAL #21  
CACRON TAPE  
HEMOCLIP, SMALL  
HEMOCLIP, MED.  
HEMOCLIP, LRG.  
RAZOR, PROP  
MAGNETIC NEEDLE MAT  
SUCTION TUBING 20'

## INSTRUMENTS & EQUIPMENT

LAPAROTOMY SET  
EXTRA LONG INSTR.  
RETR. UPPER HAND  
BOSEL CLAMPS  
HEADLIGHT, FIBEROPTIC  
DEEP BALFOR

## DRAINS

PENROSE 1" X 36"  
JACKSON PRATT, 7MM & 10MM  
JACKSON PRATT RESERVOIR  
CATH. MALCOTT 22GR.  
CATH. RED RUBBER 14FR.

## HAVE AVAIL. INTERNAL STAPLES

TA 30,55,90. - 3.5MM & 4.8MM  
TA 30,55,90/ - 3.5MM & 4.8MM  
GIA MULTI USE UNIT & GUN  
POWERED PLDS-15W

## DRUGS

CEFADYL 1GM.  
THROMBIN 10,000U

## SYRINGE

SYRINGE, 30CC LL  
SYRINGE, 60CC LL  
SYRINGE, 10CC LL  
SYRINGE, 60 CC SLIP TIP

## COLOSTOMY BAG

COLOST/TLEOST FLNG, 100MM X 4"  
COLOST/TLEOST FLNG, 70MM X 4"  
LOOP OSTOMY, 100MM  
LOOP OSTOMY, 70MM

## DRESSINGS

TELEA  
GAUZE, 4 X 8"  
ABD. STERILE

LAPAROTOMY LIST B EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

2 ARMY/NAVYS  
2 SHARP RAKES  
1 WIDE MALLEABLE  
1 NARROW MALLEABLE  
1 WIDE DEAYER  
1 NARROW DEAYER  
1 LARGE RICHARDSON  
1 MEDIUM RICHARDSON  
1 SMALL RICHARDSON  
1 WIDE HARRINGTON  
1 NARROW HARRINGTON  
1 BALFOUR  
2 TONSIL SUCTIONS  
6 BALL CLIPS

PEEL PACK:  
-----

4 REGULAR TOWEL CLIPS  
2 #3 KNIFE HANDLES  
1 #4 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
1 LONG THUMBS WITHOUT TEETH  
2 LONG RUSSIANS  
2 FINE GYNES  
2 ADSONS WITH TEETH  
2 LONG ATRAGRIPS  
1 POOL SUCTION

WRAP IN TOWEL:  
-----

2 MEDIUM HEMOCLIP APPLIERS - LONG  
  
2 MEDIUM NEEDLE HOLDERS  
2 LONG NEEDLE HOLDERS - NOT FINE  
2 SPONGE STICKS  
4 LONG CURVES  
4 LAUERS  
4 TONSILS  
4 ROCKERS  
2 BABCOCKS  
4 ALLISES  
10 CURVED CRILES  
4 CURVED MOSQUITOES  
1 SUTURE SCISSOR  
1 MAYO SCISSOR  
2 METZ SCISSORS  
1 LONG METZ SCISSOR

# MEDIANSTERNOTOMY EQUIPMENT LIST

## SUTURE

MAXON 2-0 T-25  
MAXON 3-0 t-25  
SILK 3-0 SH  
SILK 2-0 SH  
SILK 3-0 STRAND  
SILK 2-0 STRAND  
STAPLE LOADING UNIT SM-35W

## SUPPLIES

BASIN, MAJOR SET  
GOWN, STER BACK LRG  
GOWN, STER BACK XLRG  
SHEET, LAB  
SHEET, MEDIUM  
TABLE COVER  
TRAY, SKIN SCRUB

## GLOVES

GLOVES, EXAM LRG UNSTERILE  
GLOVES, TRIPLEX

## CAUTERY

CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, ELECTROSWITCH HANDSWITCH

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #21  
BONE WAX W-31G  
DACRON TAPE 8618-00  
DURA HOOKS, (FISH HOOKS)  
MAGNETIC INSTRUMENT MAT  
MAGNETIC NEEDLE MAT  
NEEDLE, SPINAL 22 GA X 3 1/2  
SYRINGE, 30CC LL  
SYRINGE, BULB

## SPONGES

SPONGE, 18 X 18 LAP  
SPONGE, GAUZE X-RAY DETECT  
SPONGE, KITTNER DISSECTORS

## SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

## SOLUTIONS

SOLUTION, IRRIG WATER 1500ML  
SOLUTION, IRRIG NACL 1000

## INSTRUMENTS & EQUIPMENT

CARDIOVASCULAR TRAY  
CHEST SET  
EX. LONG INSTRUMENTS  
HEADLIGHT  
LAP SET  
N.B, EX LONG  
RET, HIMMELSTEIN  
RETR, MOARSE  
STERNAL SAW  
SCISSOR, LONG FINE METZ  
TRAUMA CHEST TRAY

## DRAINS

CHEST TUBE 32FR THORACIC  
CHEST TUBE 36FR THORACIC  
PLEUROVAC, ADULT

## DRESSINGS

DRESSING, GAUZE 4X8 12 PLY  
DRESSING, TELFA

## VASCULAR

FELT 3 X 3  
SUTURE BOOTS  
VESSEL LOOPS, MAXI  
VESSEL LOOPS, MINI

OPEN HEART PAN 1 EQUIPMENT LIST

BOTTOM OF PAN

-----  
ANGLED PUMP SUCKERS  
#9 FRAZIER SUCTION TIP  
#11 FRAZIER SUCTION TIP  
#7 FRAZIER SUCTION  
TONSIL SUCTION TIPS  
STERNAL LG ANGLED PUMP SUCTION TIP  
TRAUMA SCISSOR

WRAP IN TOWEL

-----  
ANGLED DEBAKEY  
MEDIUM ATRAGRIPS  
LONG ATRAGRIPS  
RUMEL STYLETS

WRAP IN TOWEL

-----  
ADSON W/TEETH  
ADSON W/OUT TEETH  
SHORT THUMB W/TEETH  
LONG THUMBS W/TEETH  
LONG RUSSIANS  
DIAMOND JAW ADSON  
#3 KNIFE HANDLE  
#4 KNIFE HANDLE  
#7 KNIFE HANDLES

STRINGER #1

-----  
FOGARTY BULLDOG CLAMP  
RUMEL CLAMP RIGHT ANGLE  
KIDNEY PEDICLE CLAMP  
TUBING CLAMPS  
LONG NEEDLE HOLDERS  
MEDIUM NEEDLE HOLDERS  
SHORT FINE NEEDLE HOLDERS  
RUGGLES NEEDLE HOLDER  
PEDIATRIC MIXTER  
ST COARCTATION CLAMP.#7110  
ANG COARCTATION CLAMP.#7112  
LG SIDE OCCLUSION CL.#4085  
SM SIDE OCCLUSION CL.#4084  
CROSS CLAMP.....CL.#466  
POTTS ANGLED SCISSORS  
RUMEL THORACIC ARTERY FORCEPS  
KAY-LAMBERT CLAMP ...#3585

STRINGER #2

-----  
TONSIL CLAMPS  
LAUERS  
ST FINE MOSQUITO  
CR FINE MOSQUITOES  
CR CRILES  
SUTURE SCISSORS  
MAYO SCISSORS  
REGULAR METZ SCISSORS



OPEN HEART PAN 2 EQUIPMENT LIST

PEEL PACK

-----  
ASSORTED DILATORS  
TRACH HOOK  
#3 LONG KNIFE HANDLE  
#3 SHORT KNIFE HANDLE  
#4 KNIFE HANDLE  
NERVE HOOK  
PARHAM BANDS  
ASSORTED ELEVATORS

RACK

-----  
LARGE TOWEL CLIPS  
KOCHERS  
STRAIGHT CRILES  
CURVED CRILES  
BABY TOWEL CLIPS  
SMALL TUBING CLAMPS  
ALLIS  
CURVED OSCHNER  
STRAIGHT MOSQUITOES  
LARGE LONG HEMOCLIP APPLIERS  
MED LONG HEMOCLIP APPLIER  
HEMOOCLIP APPLIER

LOOSE IN PAN

-----  
SHARP RAKE  
WIDE RACK  
ARMY/NAVY  
MEDIUM RIBBON  
LONG RULER (1 SET HAS 1)  
PARHAM BAND TIGHTNER  
FINOCHIETTO RETRACTOR  
ADSON RONGUER  
BALL CLIPS (PEEL PACK)  
MEDIUM WEITLANERS  
CT LIGHT HANDLE

SHORT STRINGER

-----  
CURVED MOSQUITOES  
SHORT NEEDLE HOLDER  
RUGGLES NEEDLE HOLDER  
MEDIUM LAUER  
REGULAR METZ SCISSOR  
BABY SUTURE SCISSOR  
BABY METZ SCISSOR  
REGULAR SUTURE SCISSOR  
SM MED HEMOCLIP APPLIERS  
SM SHORT HEMOCLIP APPLIERS  
BABY WEITLANERS

WRAP IN TOWEL

-----  
SHORT ATRAGRIPS  
FINE GYNE THUMBS  
ADSON THUMBS W/TEETH  
#3 SHORT KNIFE HANDLE  
BENNS RETRACTORS  
ARMY/NAVY  
HEMOCLIP HOLDER

CL. THORACIC ANEURYSM EQUIPMENT LIST

DEBAKEY AORTIC ANEURYSM CLAMPS

-----  
#FB471

#FB472

#FB473

DEBAKEY NON-TRAUMATIC VESSEL CLAMPS

-----  
#FB510

#FB511

#FB512

#FB513

# THORACOTOMY LIST

## SUTURE

SILK A-306H 0 STRAND  
SILK 8A-75H 2-0 STRAND  
SILK 8A-74H 3-0 STRAND

## STICK TIES

SILK R-33H 2-0  
VICRYL J-833H 2-0 SR  
SILK R-832H 3-0  
CHROMIC G-122H 3-0 SR

## BRONCHUS

VICRYL J-304H 4-0 RA-1 (use with  
2-0 silk strand for chest  
tube skin stitch)  
NEEDLE 3/8 CUTTING 2090-14

## OR

SILK 737G 2-0 X-0

## CLOSURE

VICRYL J-849G 2 TP-1  
MAXON 2-0 T-25 OR 628751  
MAXON 3-0 T-25 6287-41

## SKIN (ASK)

PDS 2-422H 4-0 PS-2  
STAPLE, LOADING UNIT SM-35W  
STAPLE GUN, SKIN

## PACKS AND DRAPE

PACK, BASIC  
BASIN, MAJOR  
BASIN, STANDARD SINGLE SET  
TRAY, SKIN SCRUB SURGERY  
COVER, MAYO STAND 8337  
SHEET, TRANSVERSE LAP  
GOWN, STER BACK XL A9541  
GOWN, STER BACK LAG A9511  
CLOTH DRAPE (SINGLE)  
TOWELS, STERILE (8 PK)

## FOLEY CATHETERS --ASK FIRST

TRAY, CATH FOLEY UNIVERSAL  
CATHETER, FOLEY W/T SENS 16FR3C  
URIMETER, DRAIN BAG

## CAUTERY

CAUTERY MACHINE  
PAD, GROUNDING ADULT  
PENCIL, ELECTROSWITCH HANDSWITCH  
BOVIE HOLDER  
ELECTRODE, BLADE EXTENDED( ARGON  
BEAM MACHINE AVAILABLE)  
ARGON BEAM PAD  
ARGON BEAM TIP

## SPONGES

SPONGES, CYLINDRICAL DISSECTORS  
SPONGE, LAP 12 X 12  
SPONGE, LAP 18 X 18  
SPONGE, GAUZE X-RAY DETECT

## SUCTION

RECEPTAL LINER 3000CC  
TUBE, CONNECTING 20 FT

## SOLUTIONS

SOLUTION, IRRIG WATER 1500ML  
SOLUTION, IRRIG NACL 1000

## MISCELLANEOUS SUPPLIES

BLADE, SURGICAL #21  
BLADE SURGICAL #10 024760  
BLADE, SURGICAL #15  
BONE WAX W-310  
DACRON TAPE 8618-00  
DRAPE, IOBAN 6648  
HEMOCLIP, MED  
HEMOCLIP, LRG  
MAGNETIC INSTRUMENT MAT  
MAGNETIC NEEDLE MAT AVAILABLE  
RAZOR, PREP DISP  
VESSEL LOOPS MAXI RED  
VESSEL LOOPS MINI YELLOW

## DRAINS

TUBE, CHEST 28FR THORACIC  
TUBE, CHEST 32FR THORACIC  
TUBE, CHEST 36FR THORACIC  
PLEUREVAC, ADULT

## INSTRUMENTS AND EQUIPMENT

CHEST SET  
LAPAROTOMY SET  
LUNG SPATULA  
BRAINBAG/"U" SHAPED VAC PAC  
CARDIO VASCULAR TRAY  
HEADLIGHT  
LIGHT HANDLES, BLUE RIGID (2)  
CRYO UNIT  
SCISSOR, METZ, LONG FINE  
APPLIER, HEMOCLIP, LARGE, LONG

## (HAVE AVAILABLE)

FCP, ATRAGRIP, LONG  
CLAMP, COARCTATION  
R R, EX. LONG  
RETR, MOORSE, STERNAL  
RETR, HIMMELSTEIN  
CLAMP, THORACIC ANEURYSM  
DRESSINGS

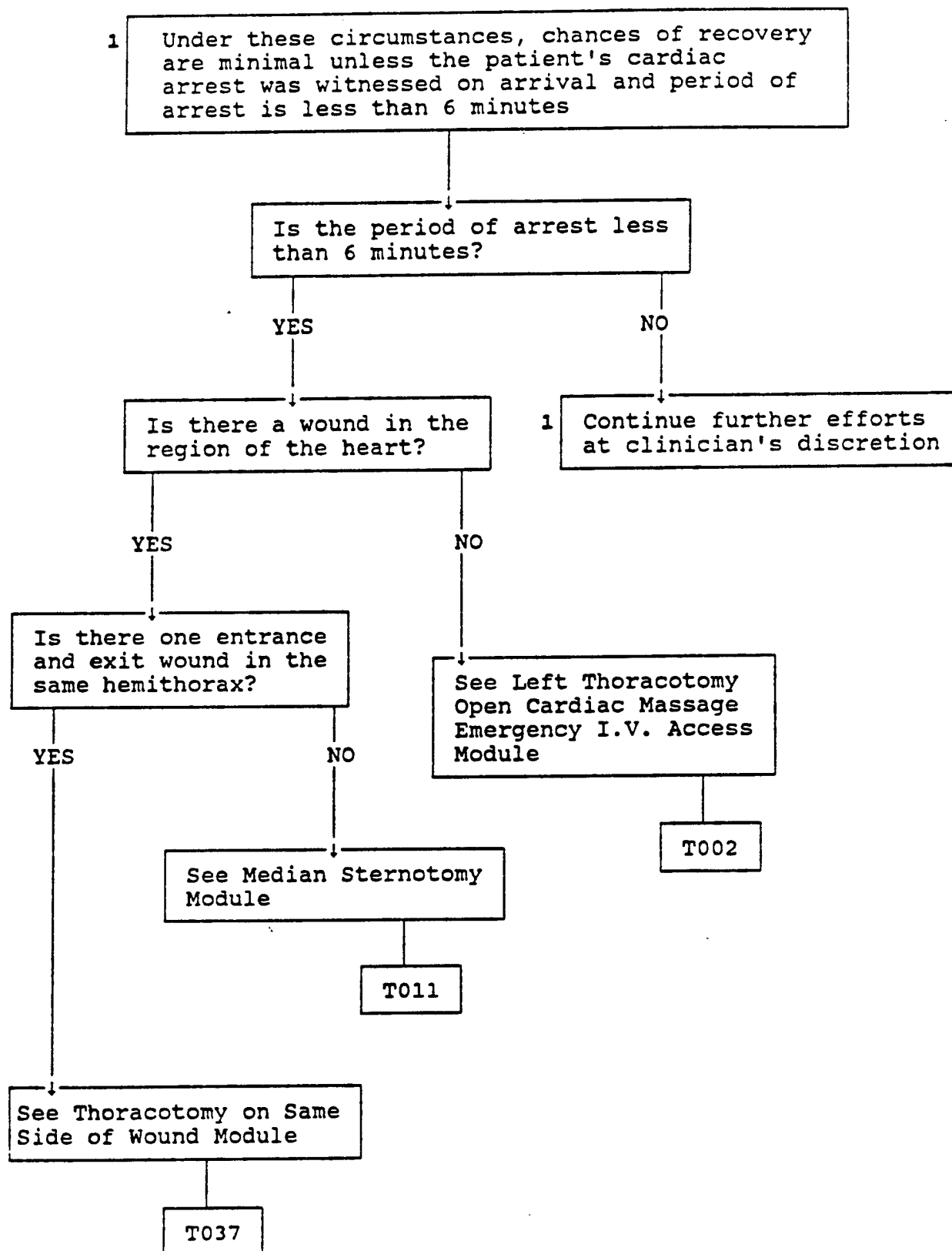
DRESSING, TELFA  
DRESSING, GAUZE 4 X 8 12 PLY  
PAPER TAPE

TRAUMA CHEST TRAY - Minimal equipment

.....

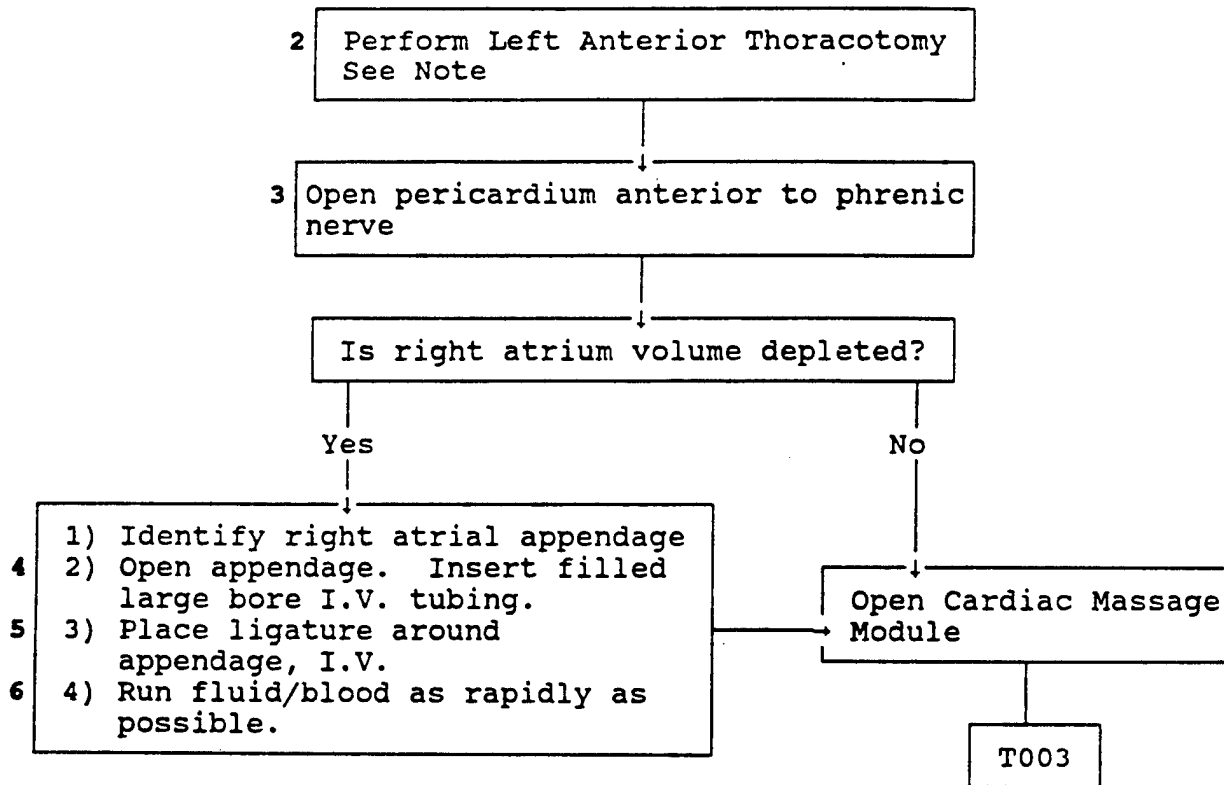
- 1 - MEDIMM FINOCHETTI RETRACTOR
- 1 - EXTRA LONG NEEDLE HOLDER
- 4 - BABY TOWEL CLIPS
- 1 - 9" CURVE
- 1 - LONG MAYO
- 1 - CURVED CRILE
- 1 - STRAIGHT CRILE
- 1 - LAUER
- 1 - STRAIGHT COARCTATION CLAMP
- 1 - TANGENTIAL OCCLUSION CLAMP
- 2 - TONSIL HEMOSTATS
- 1 - 4# KNIFE HANDLE
- 4 - TOWELS (FOLDED READY TO SQUARE OFF)
- 2 - PACKAGES COUNTED 12 BY 12'S
  - STERNAL SAW/LEBSCHNE
  - BETADINE PREP
  - SUTURE FOR REPAIR
  - SUCTION
  - CHEST TUBES
  - DRAINAGE SYSTEM

CARDIAC ARREST MODULE II



LEFT THORACOTOMY OPEN CARDIAC MASSAGE  
EMERGENCY I.V. ACCESS MODULE

T002  
1/1

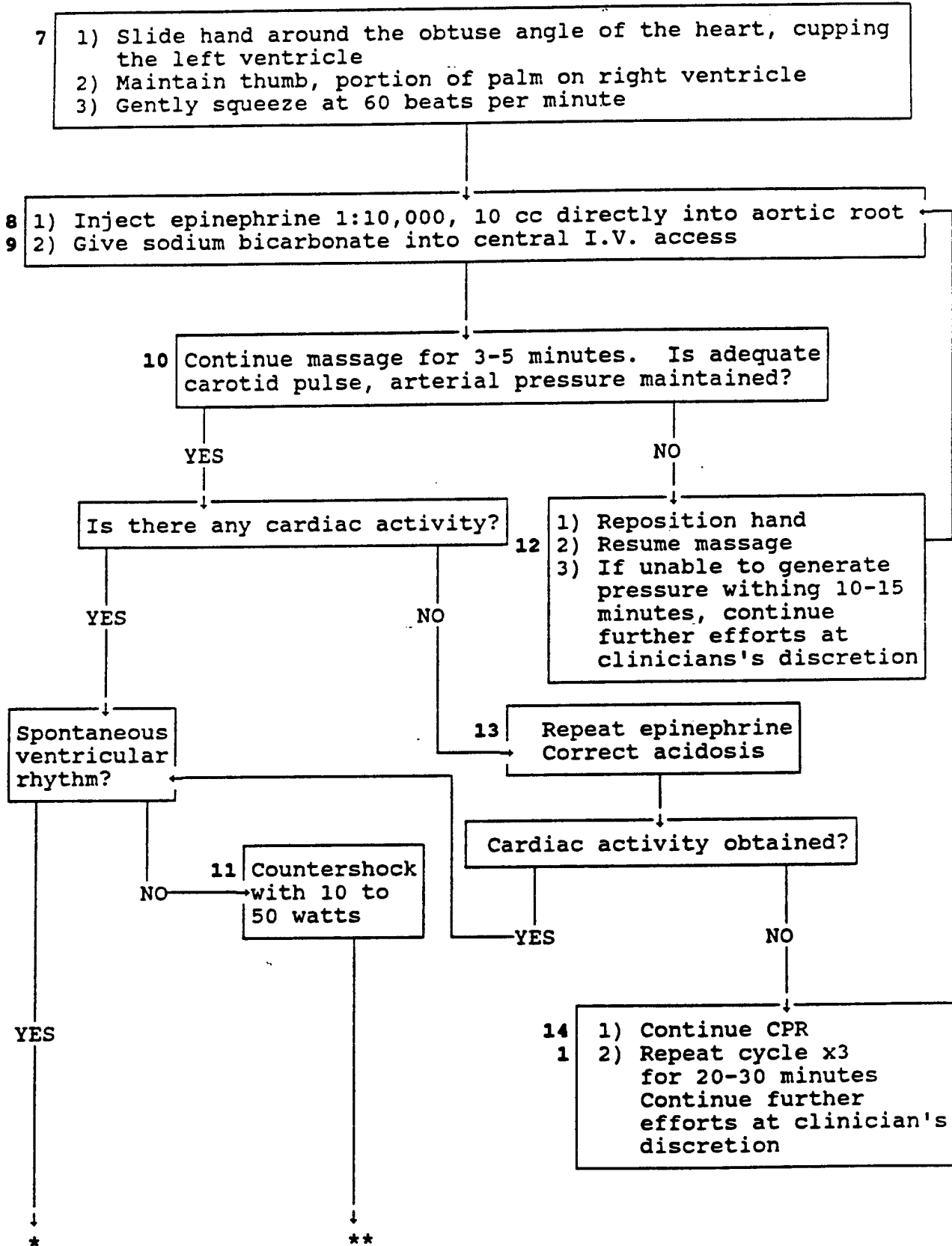


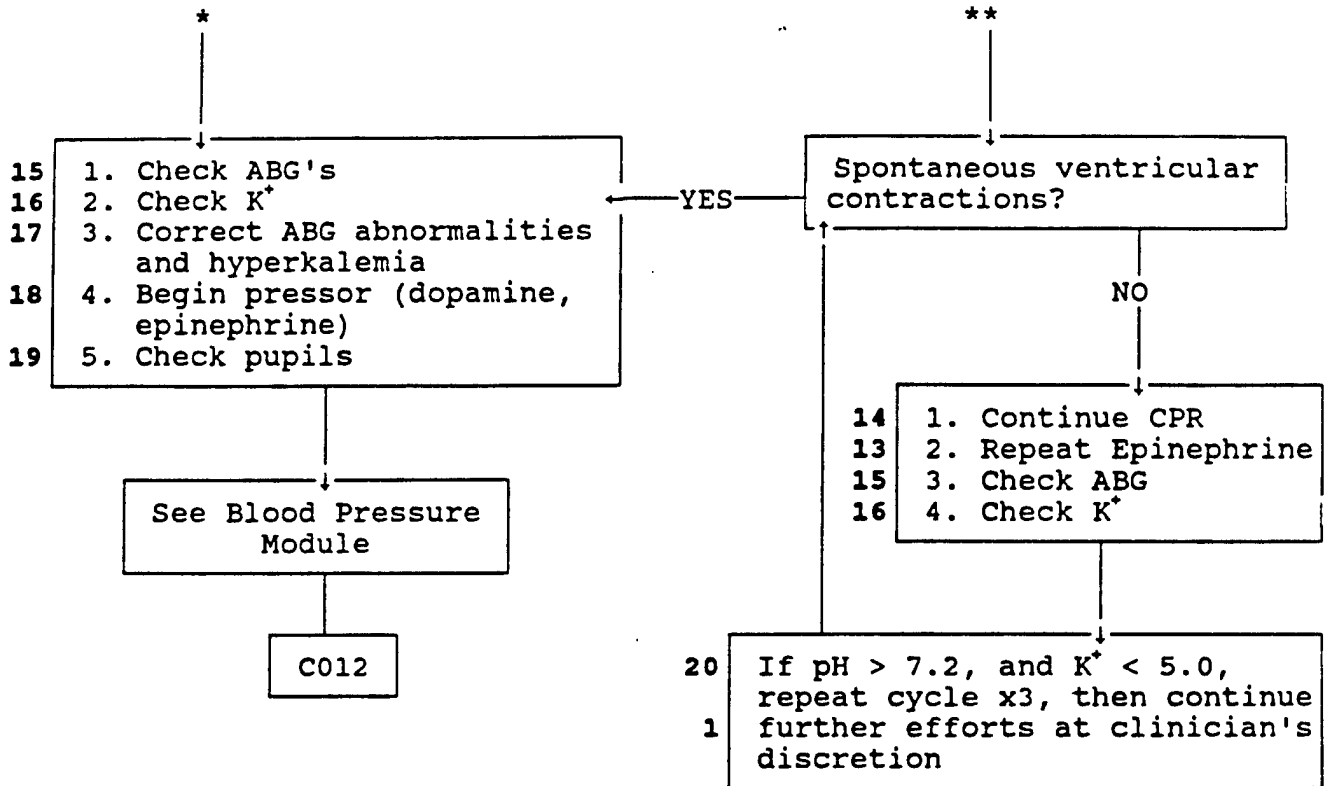
Note: See T051 for technique

OPEN CARDIAC MASSAGE MODULE

T003

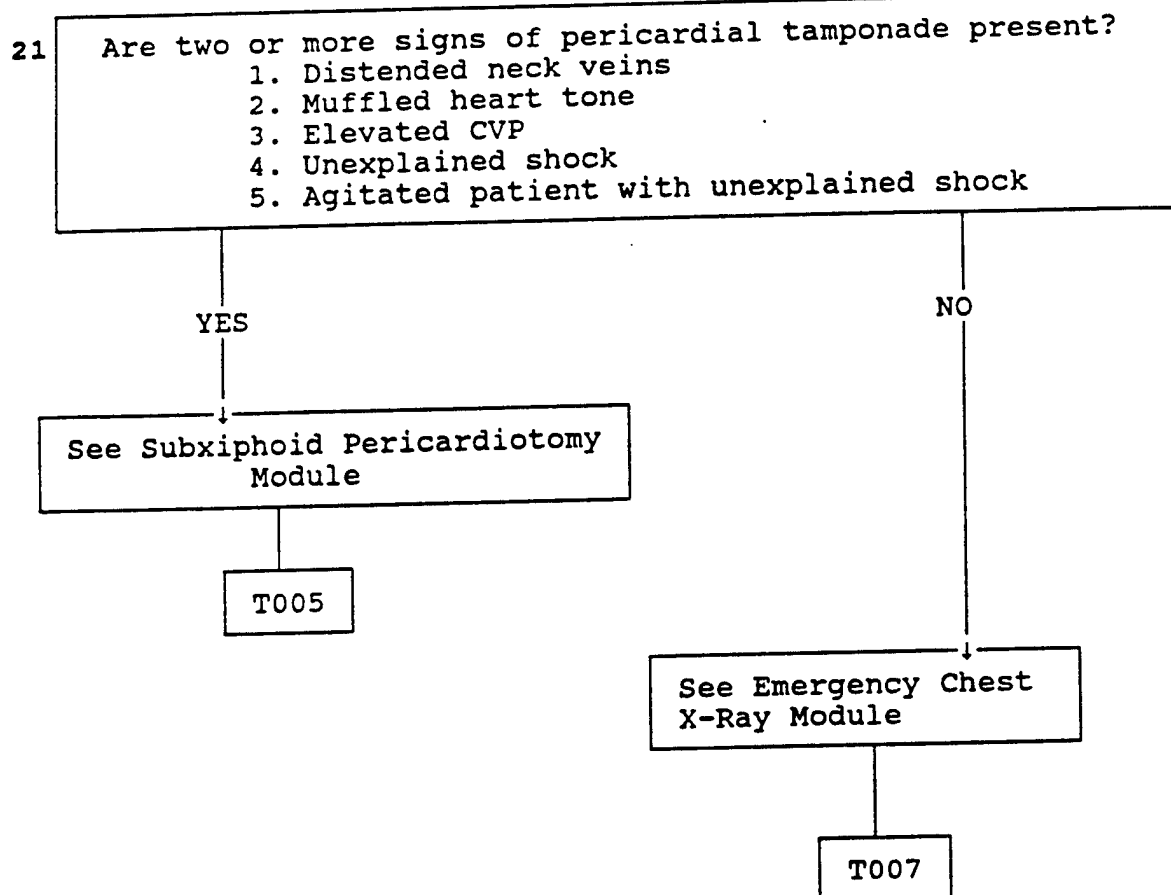
1/2





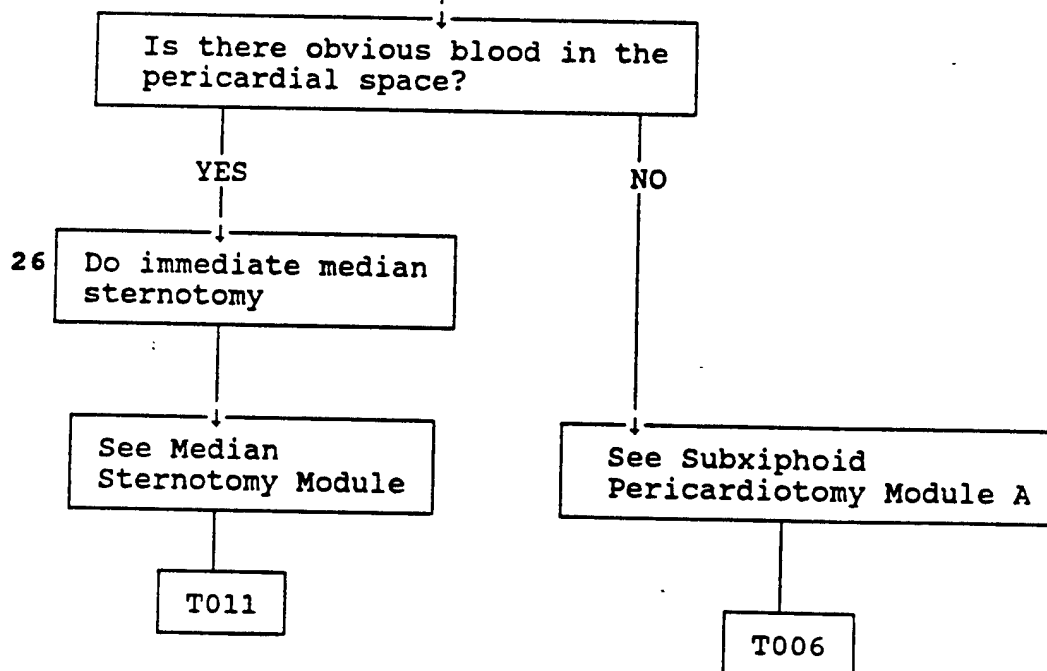


PERICARDIAL TAMPONADE MODULE

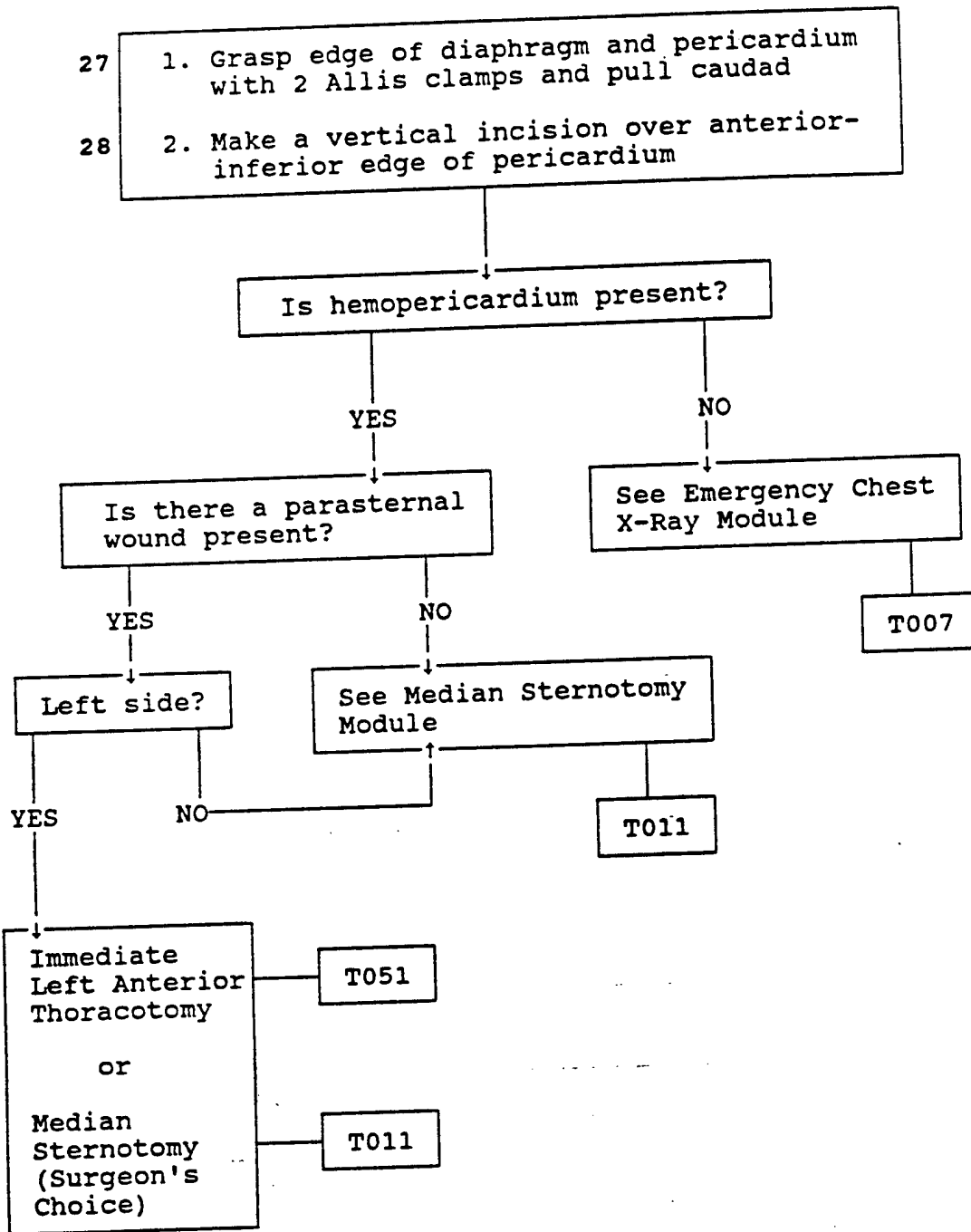


SUBXIPHOID PERICARDIOTOMY MODULE

- 22 1. Prep anterior chest wall from chin to navel and laterally to both midaxillary lines with Betadine solution for 30 seconds
- 23 2. Drape above area with sterile towels and cover with laparotomy drape
- 24 3. Make a 2-3" vertical incision over xiphoid process and with the cautery, extend incision down to xiphoid process and around and under xiphoid process, taking care to use cautery as close to xiphoid process as possible
- 25 4. With a Kocher clamp, pull up on xiphoid process, and with cautery and index finger make a tunnel under xiphoid process to undersurface of sternum
- 25 5. With sterile gauze, wipe anterior surface of pericardium laterally in both directions
- 25 6. Hook under sternum two Army-Navy retractors to be held up by assistant (remove Kocher clamp) and visualize anterior-inferior edge of pericardium

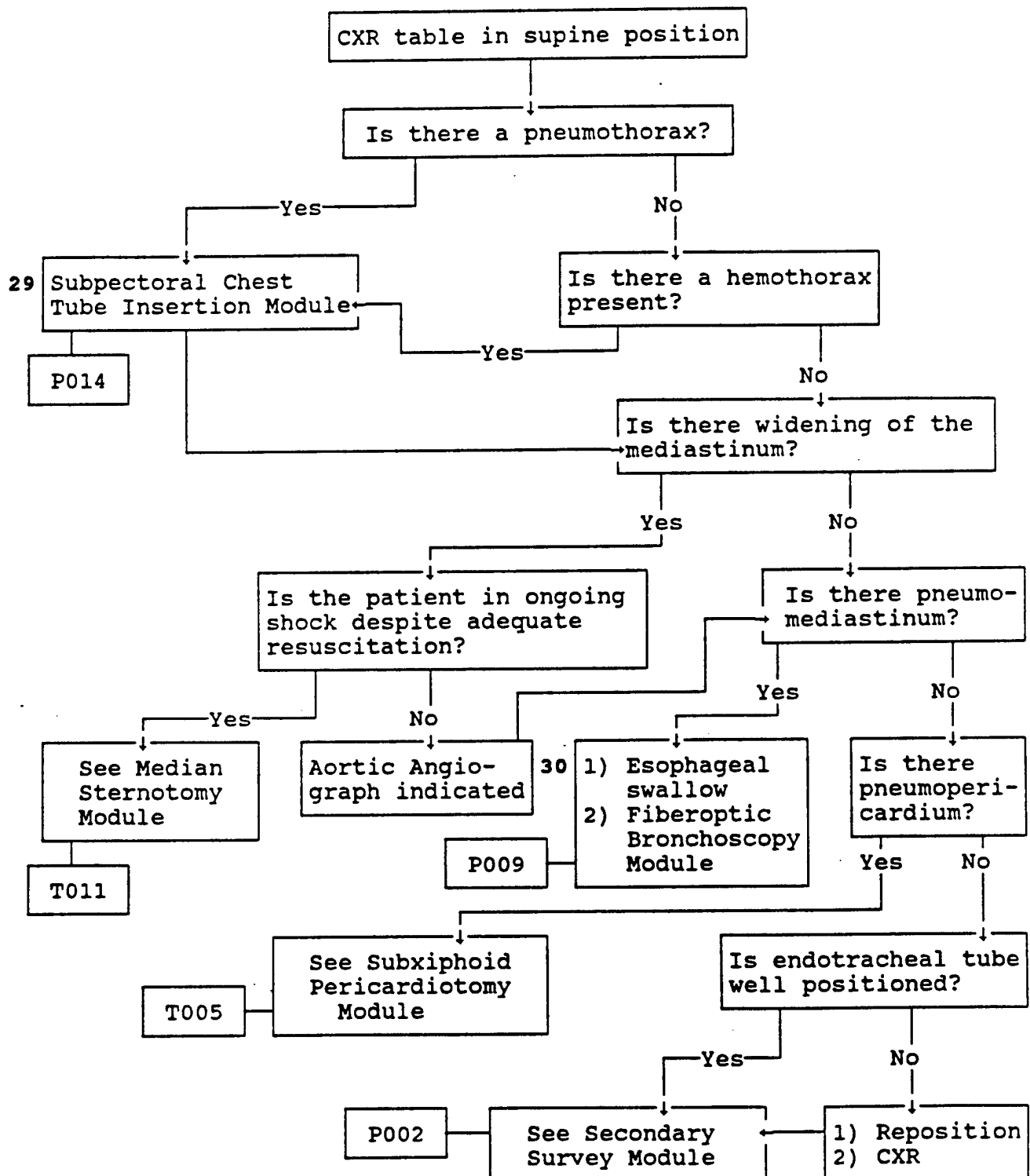


SUBXIPHOID PERICARDIOTOMY MODULE A

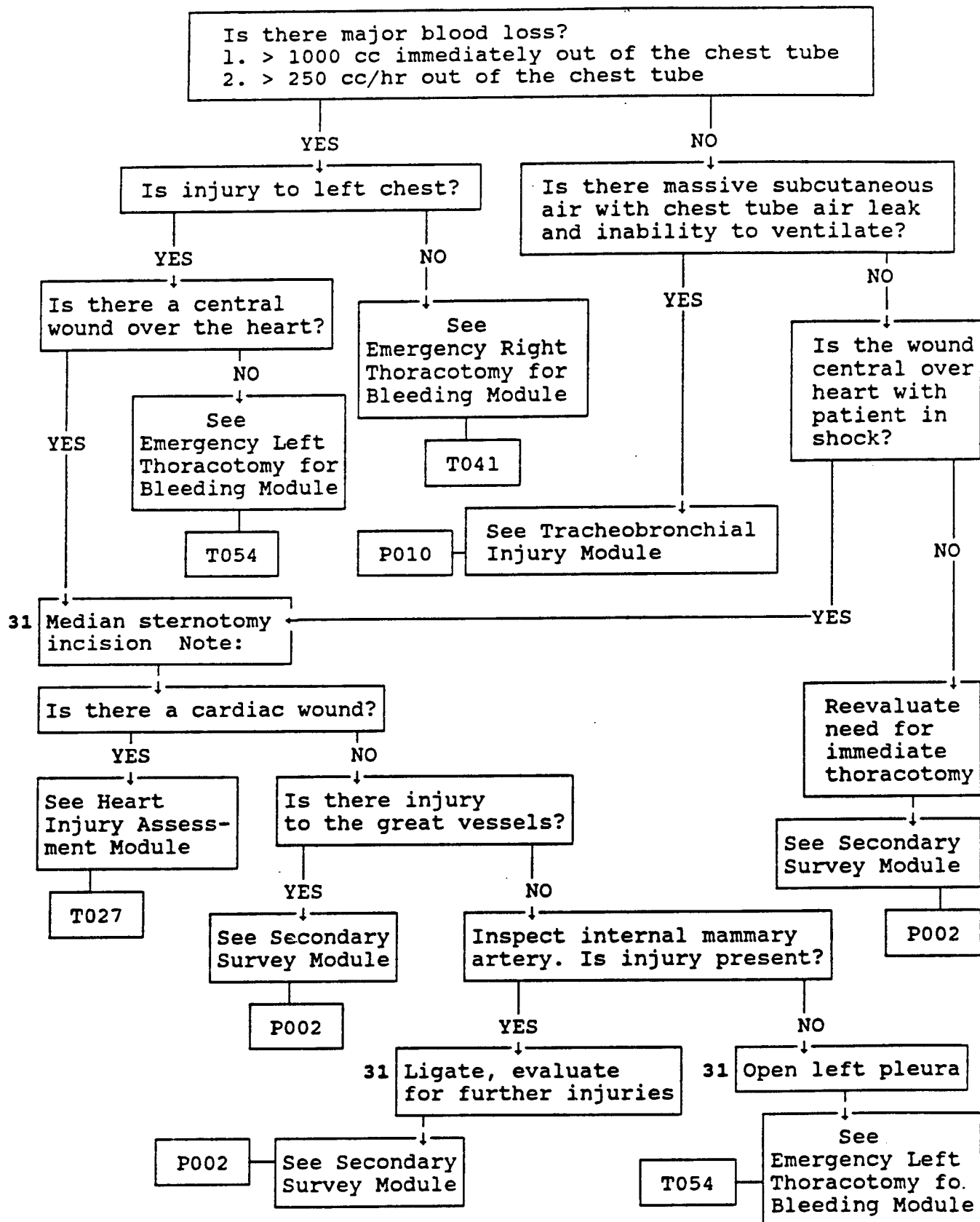


# EMERGENCY CHEST X-RAY MODULE

T007  
1/1



IMMEDIATE THORACOTOMY MODULE



Note: See T011 for technique

TRANSSTERNAL THORACOTOMY MODULE

32

1. Extend incision transversely across sternum into opposite 5th intercostal space and extend incision into midaxillary line
2. Use cautery to carry incision down to sternum and intercostal muscles
3. Quickly dissect out opposite internal mammary artery and vein. Ligate or hemoclip in continuity and divide
4. Enter 5th intercostal space by opposite hemithorax by using cautery on top of 6th rib
5. Divide sternum with sternal saw or Lebsche knife or Gigli saw or rib cutter
6. Use another chest retractor to open opposite hemithorax 4-6 inches

See Transsternal Thoracotomy  
Heart Assessment Module

T010

TRANSSTERNAL THORACOTOMY HEART ASSESSMENT MODULE

33

1. Extend pericardiotomy across top of diaphragm and proximally to innominate vein
2. Marsupialize pericardium with 2-0 silk sutures

Does the patient have injuries of the heart too complex to repair?

YES

1

Continue further efforts at clinician's discretion

NO

Is the patient's heart in ventricular fibrillation or Electromechanical dissociation/asystole?

YES

See Open Cardiac Massage Module

T003

NO

See Heart Injury Assessment Module

T027

MEDIAN STERNOTOMY MODULE

- 31
1. Make an incision from suprasternal notch to xiphoid process
  2. With the cautery, continue the incision down to the sternum
  3. While pushing down with an index finger on the suprasternal fascia, and while an assistant retracts with an Army-Navy retractor the superior border of the incision cephalad, cauterize the fascia immediately under the superior border of the manubrium sterni
  4. At the completion of this maneuver, the surgeon should be able to put a finger behind the sternum
  4. With a Sarns oscillating saw or with a Lebsche knife, do a median sternotomy from suprasternal notch to xiphoid process after hooking the knife or the saw under the sternum. Always pull up as the saw or knife moves caudad
  6. With an assistant, pull the edges of the sternum apart and cover the edges of the sternum with sterile towels
  7. Place sternal retractor in between the sternal edge and retract open at least 4 inches

Do the lungs and pleura meet in the midline?

YES

NO

Is there a penetrating injury in either or both pleural spaces?

34 Expose pericardium by wiping surface with a sterile gauze from diaphragm to left innominate vein

YES

NO

\*

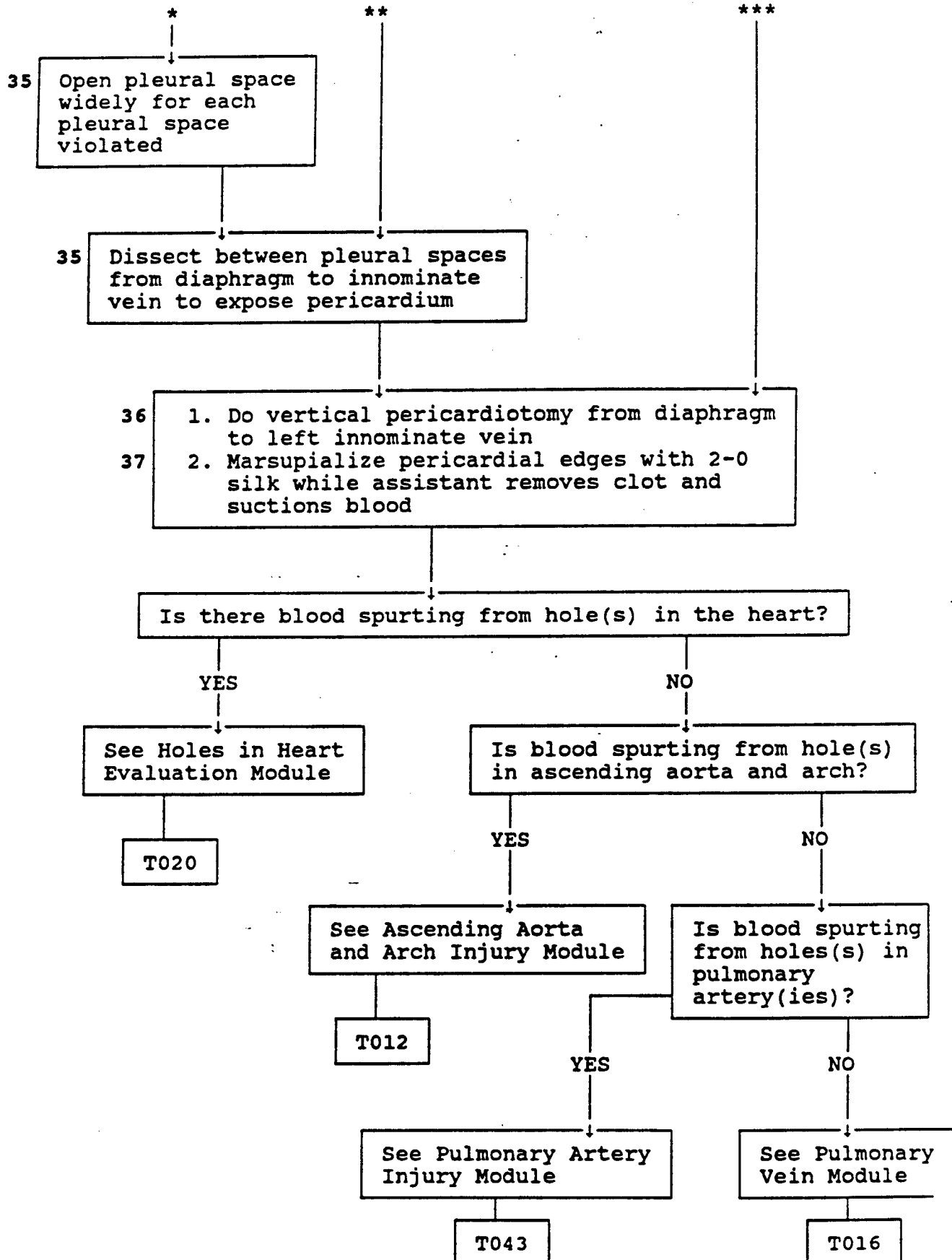
\*\*

\*\*\*



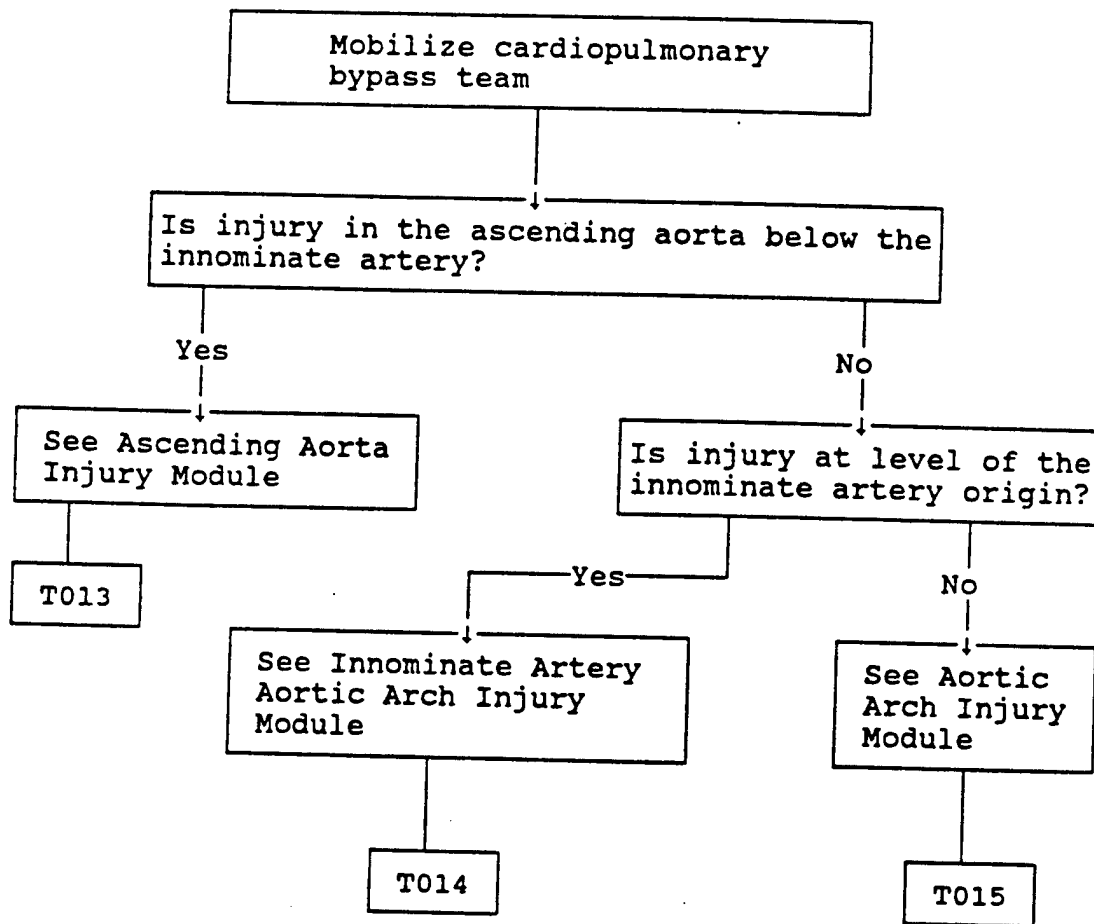
# MEDIAN STERNOTOMY MODULE

T011  
2/2



ASCENDING AORTA AND ARCH INJURY MODULE

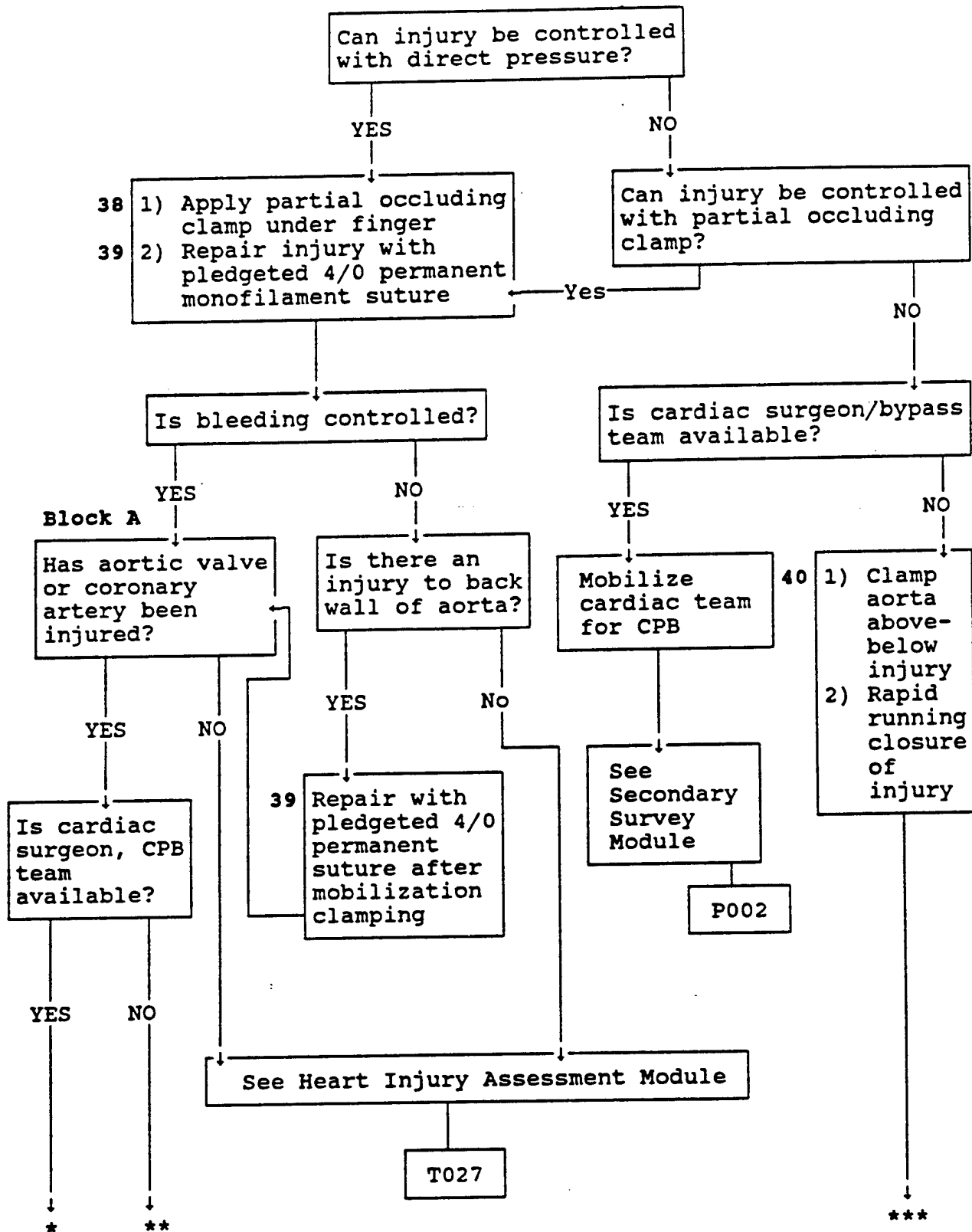
T012  
1/1



# ASCENDING AORTA INJURY MODULE

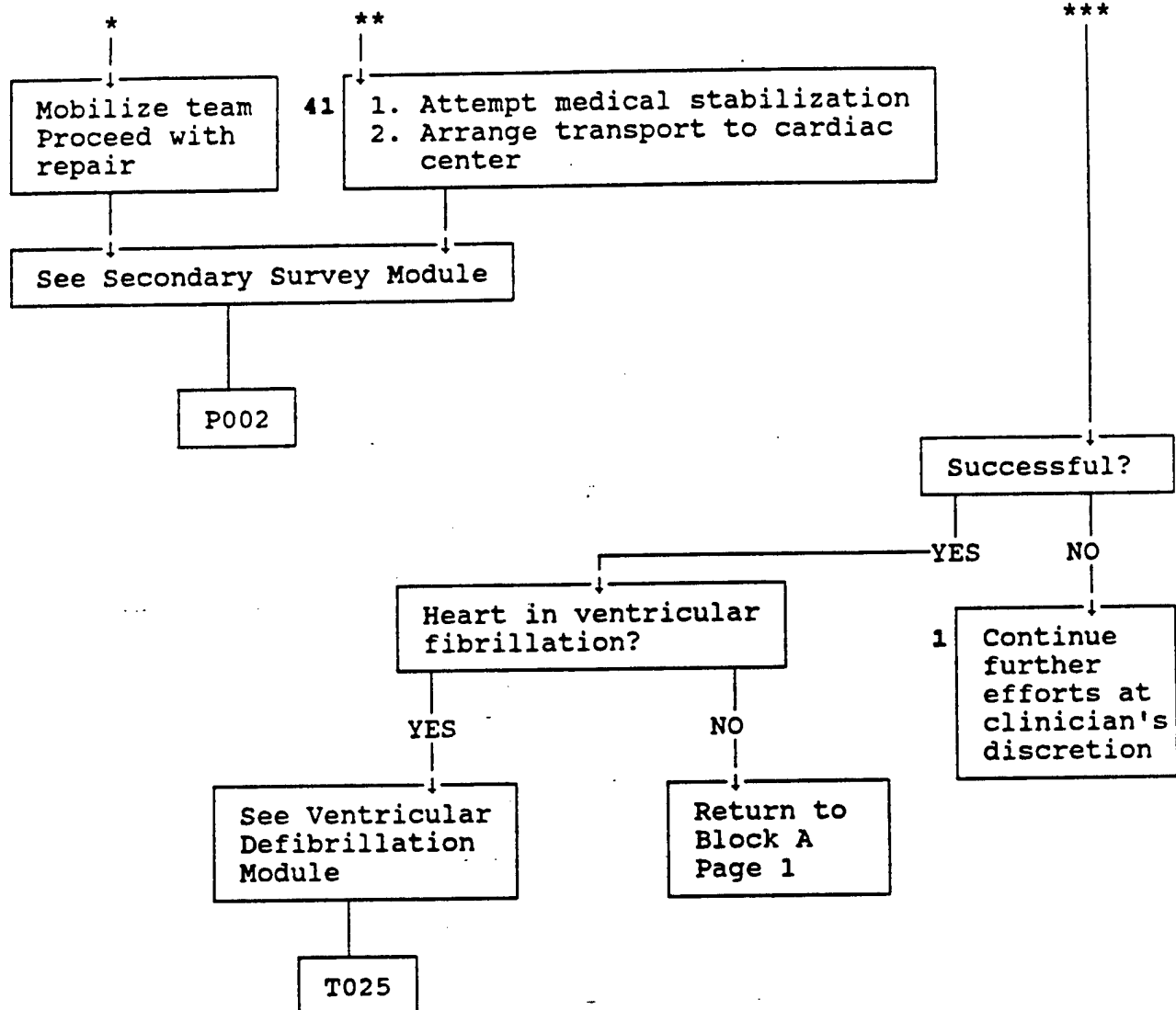
T013

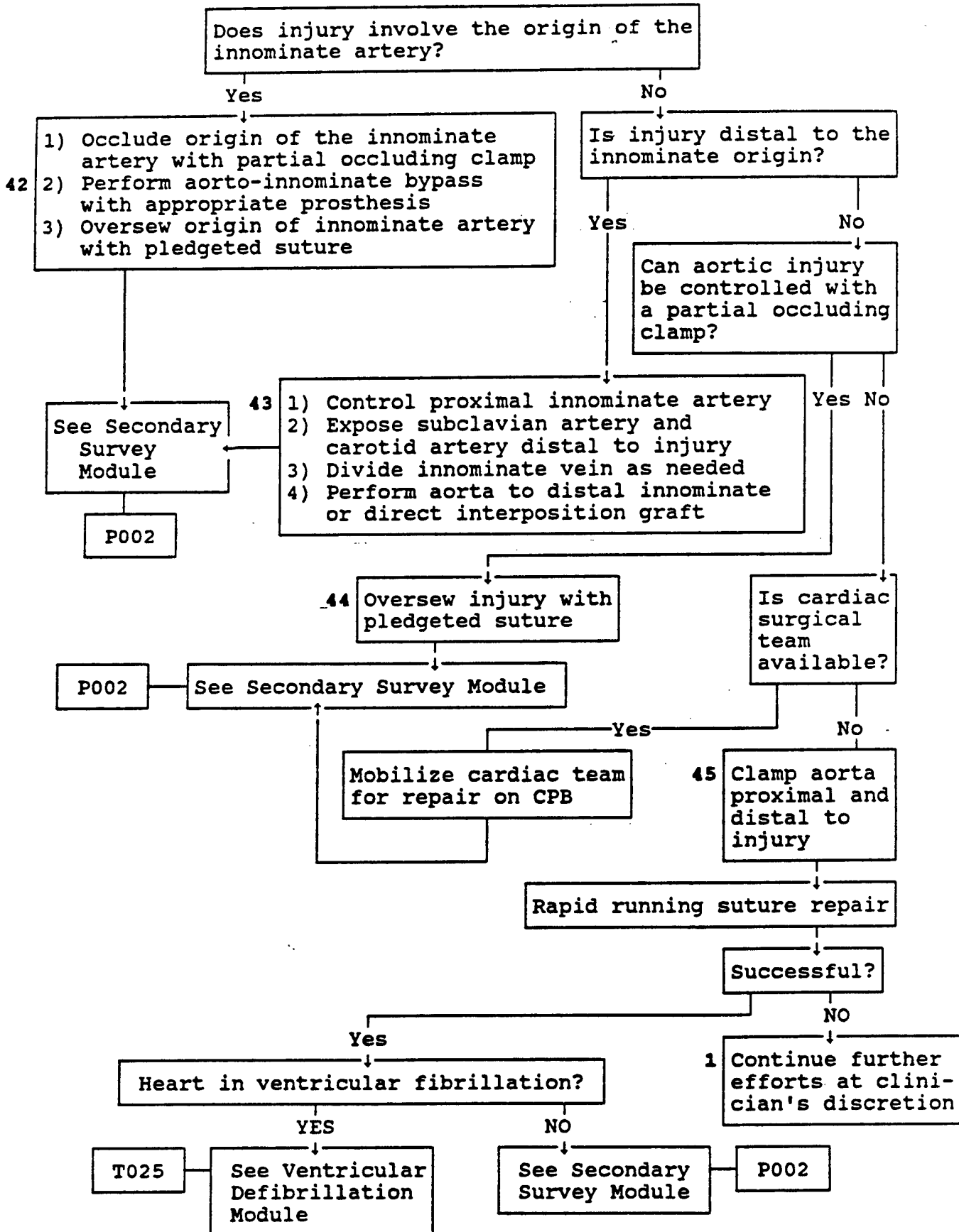
1/2

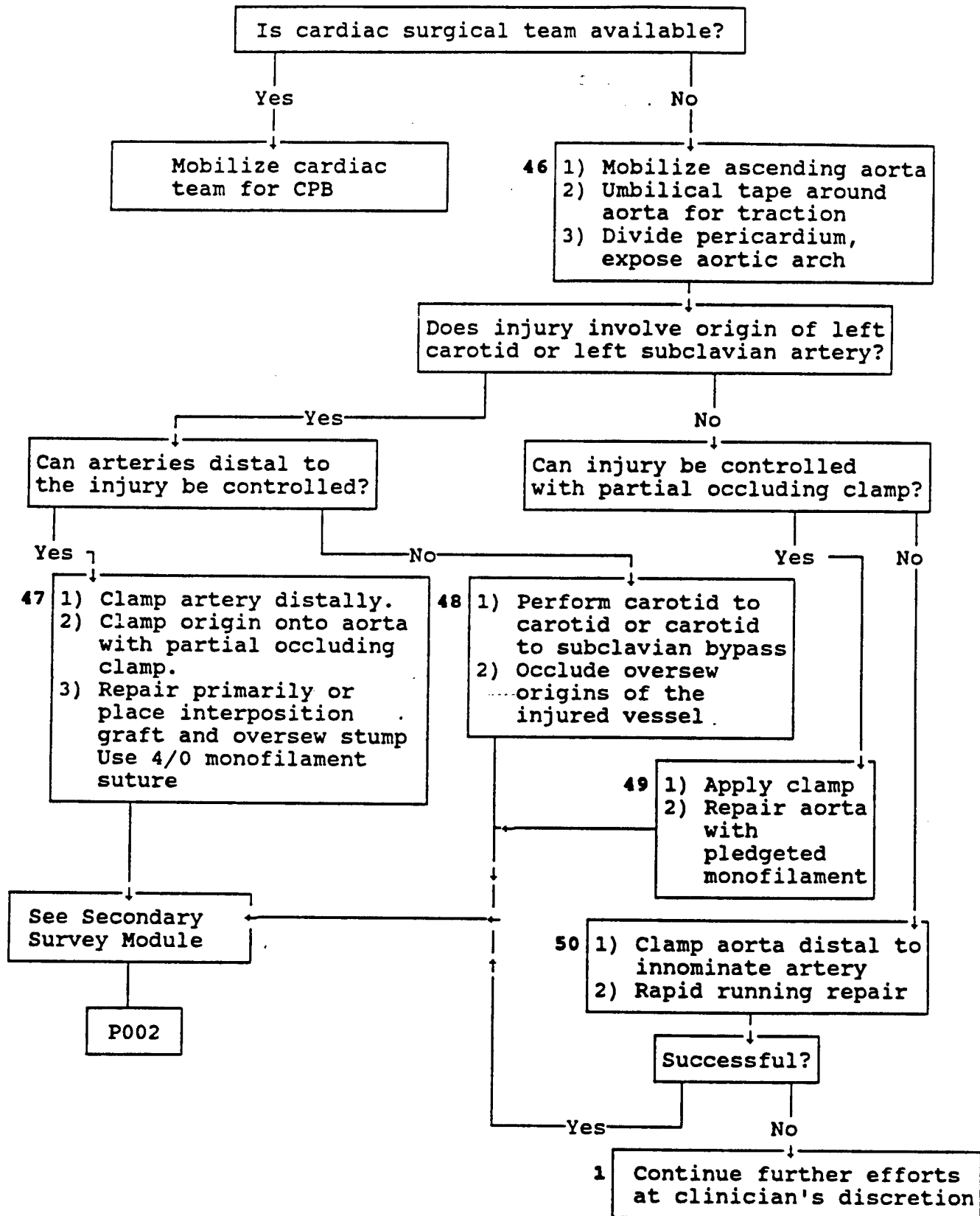


# ASCENDING AORTA INJURY MODULE

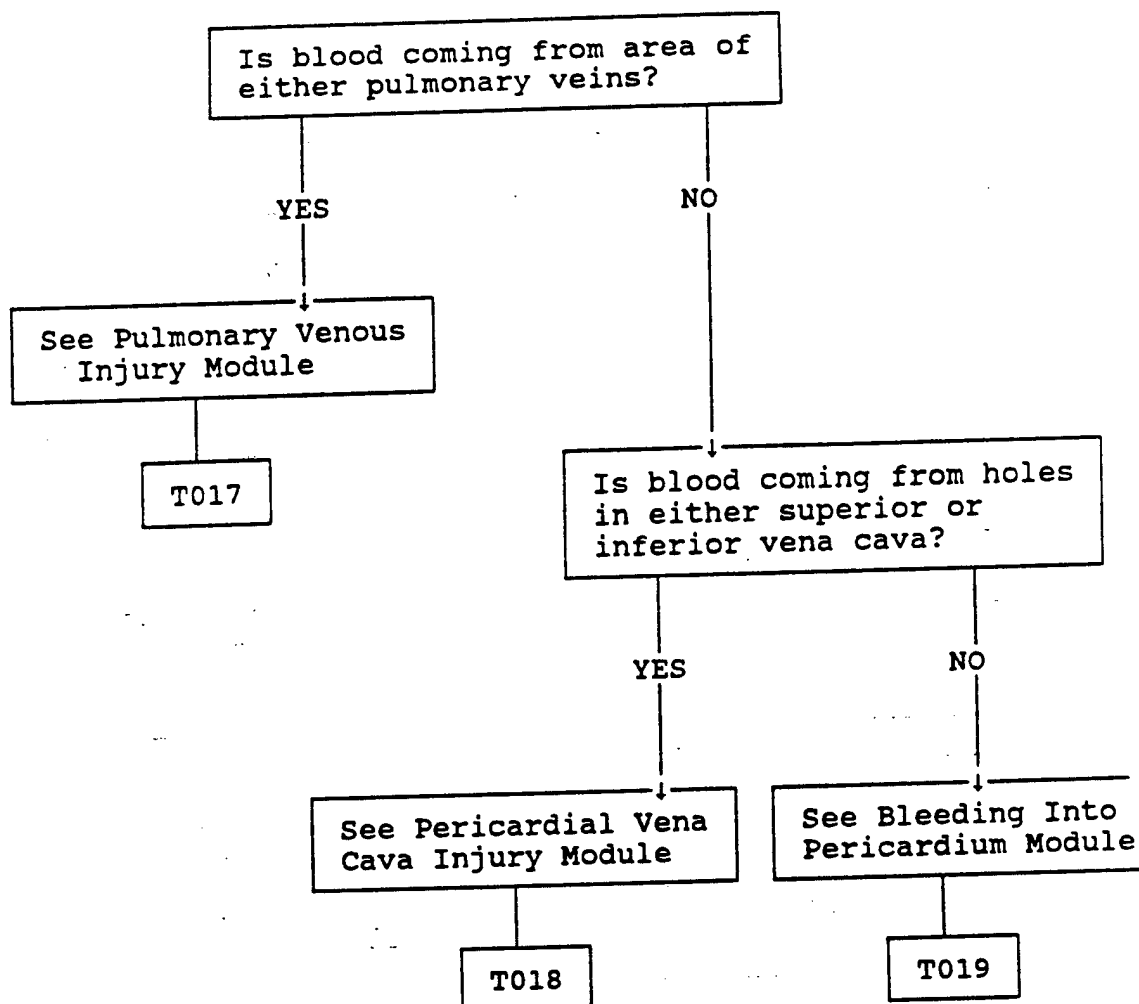
T013  
2/2



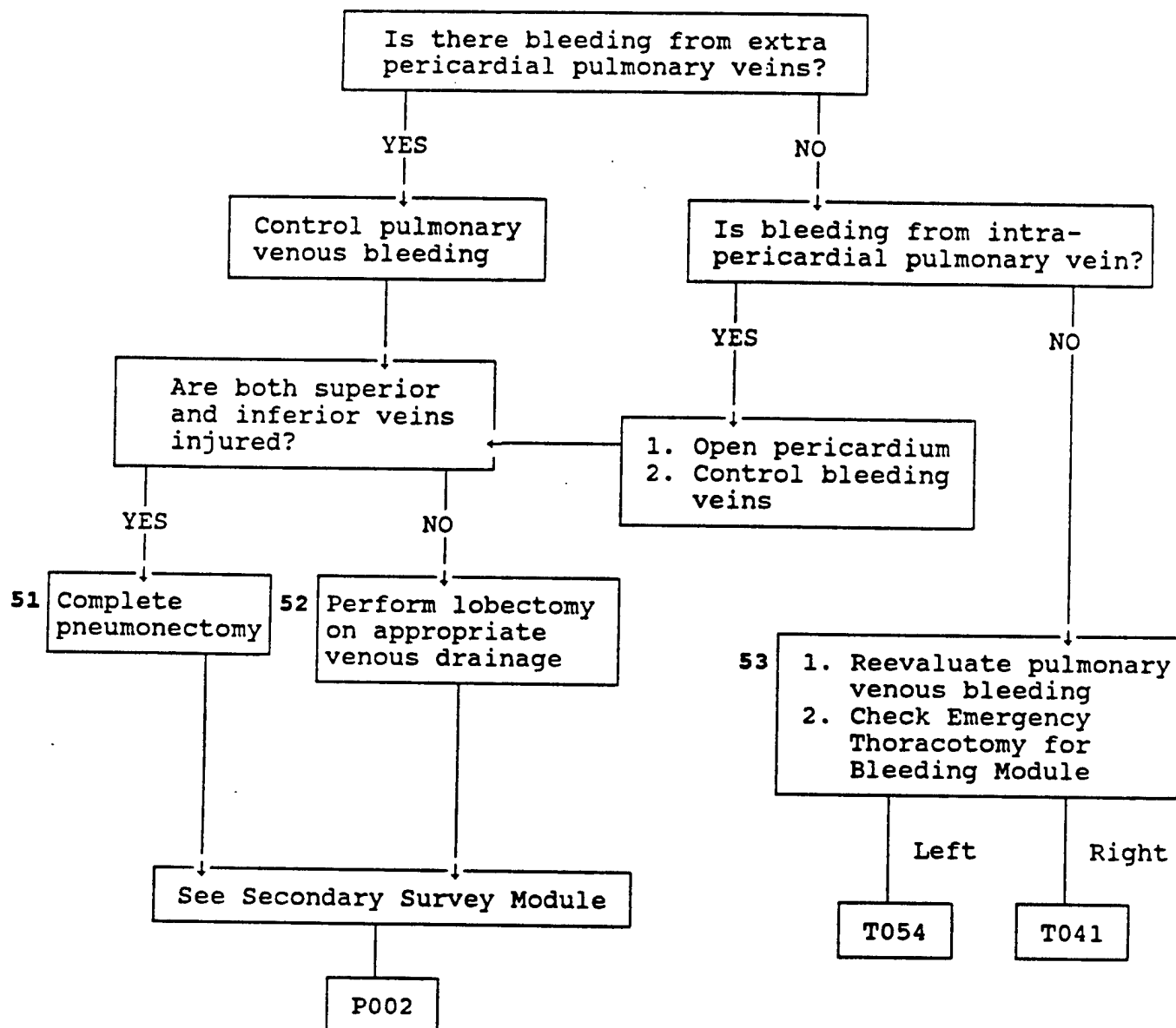




PULMONARY VEIN MODULE



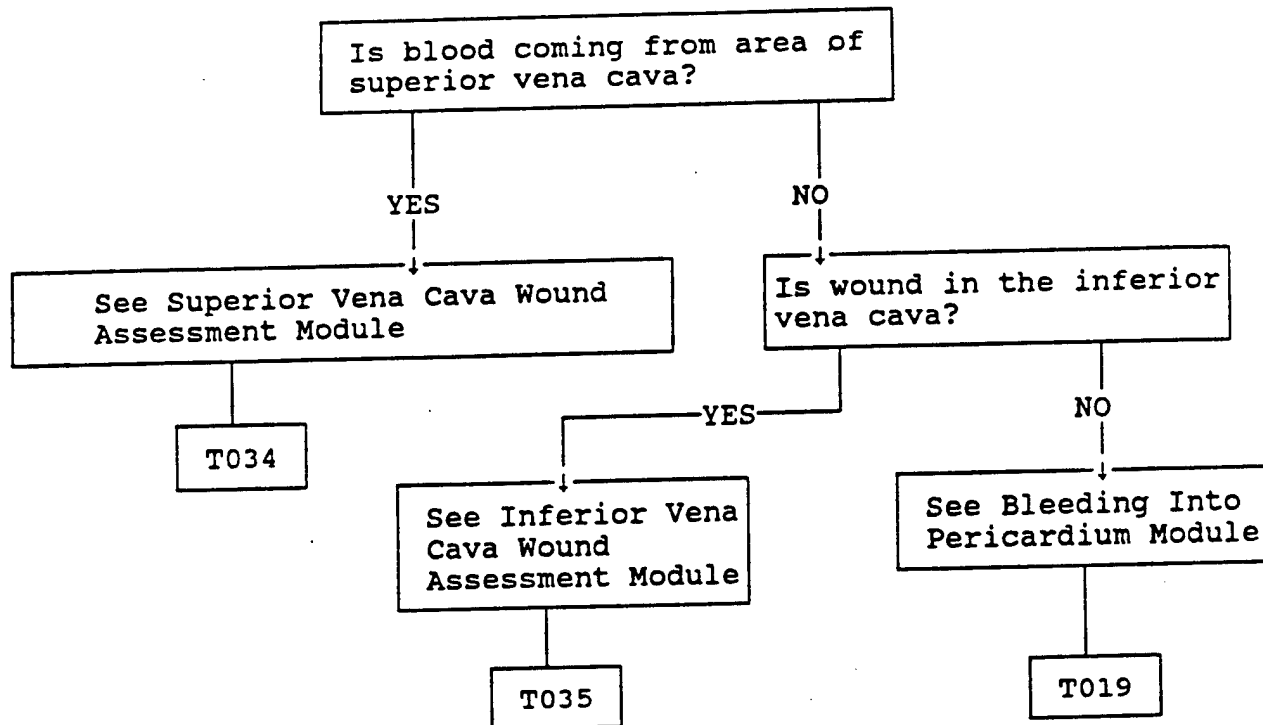
PULMONARY VENOUS INJURY MODULE





PERICARDIAL VENA CAVAL INJURY MODULE

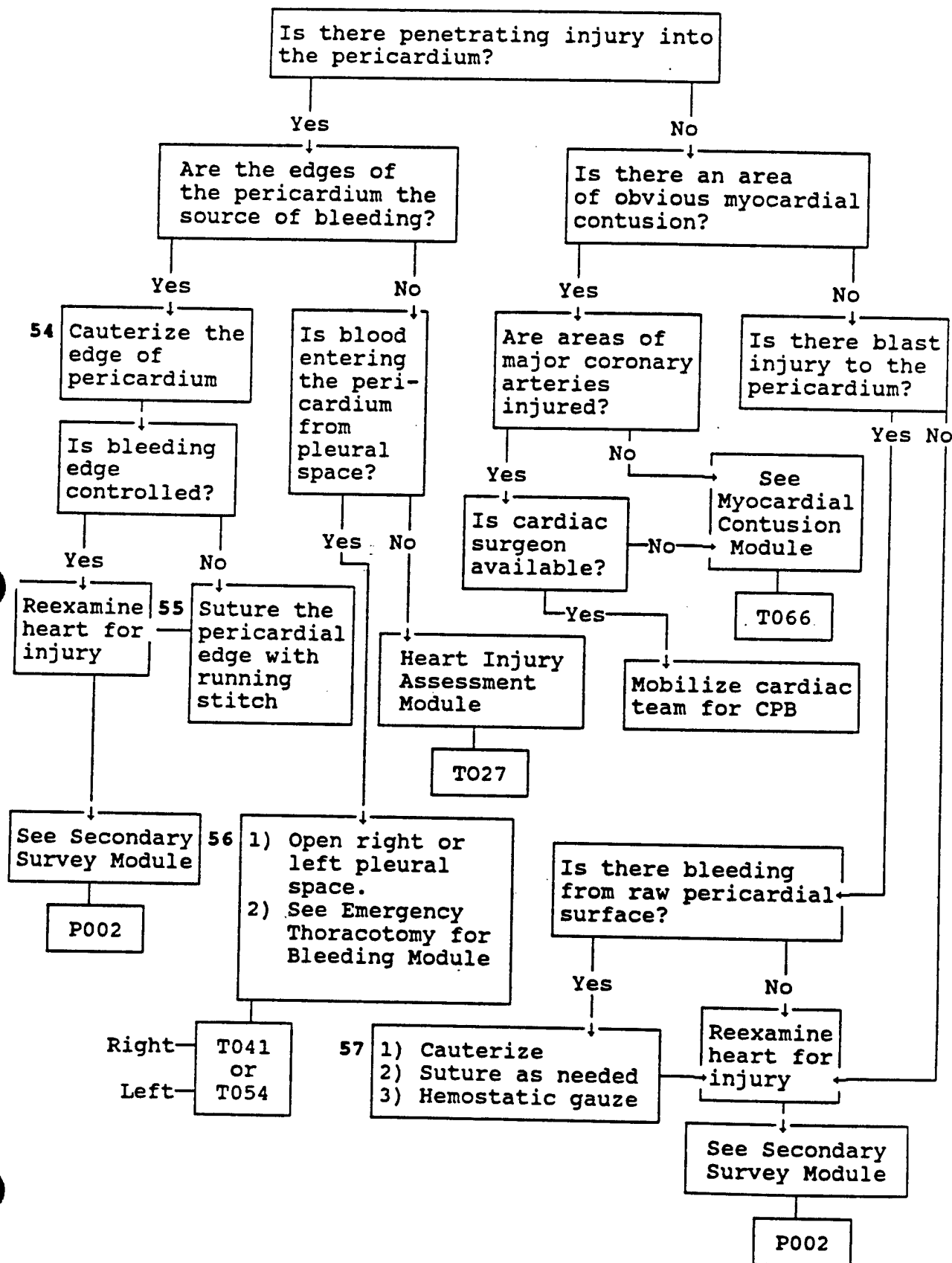
T018  
1/1



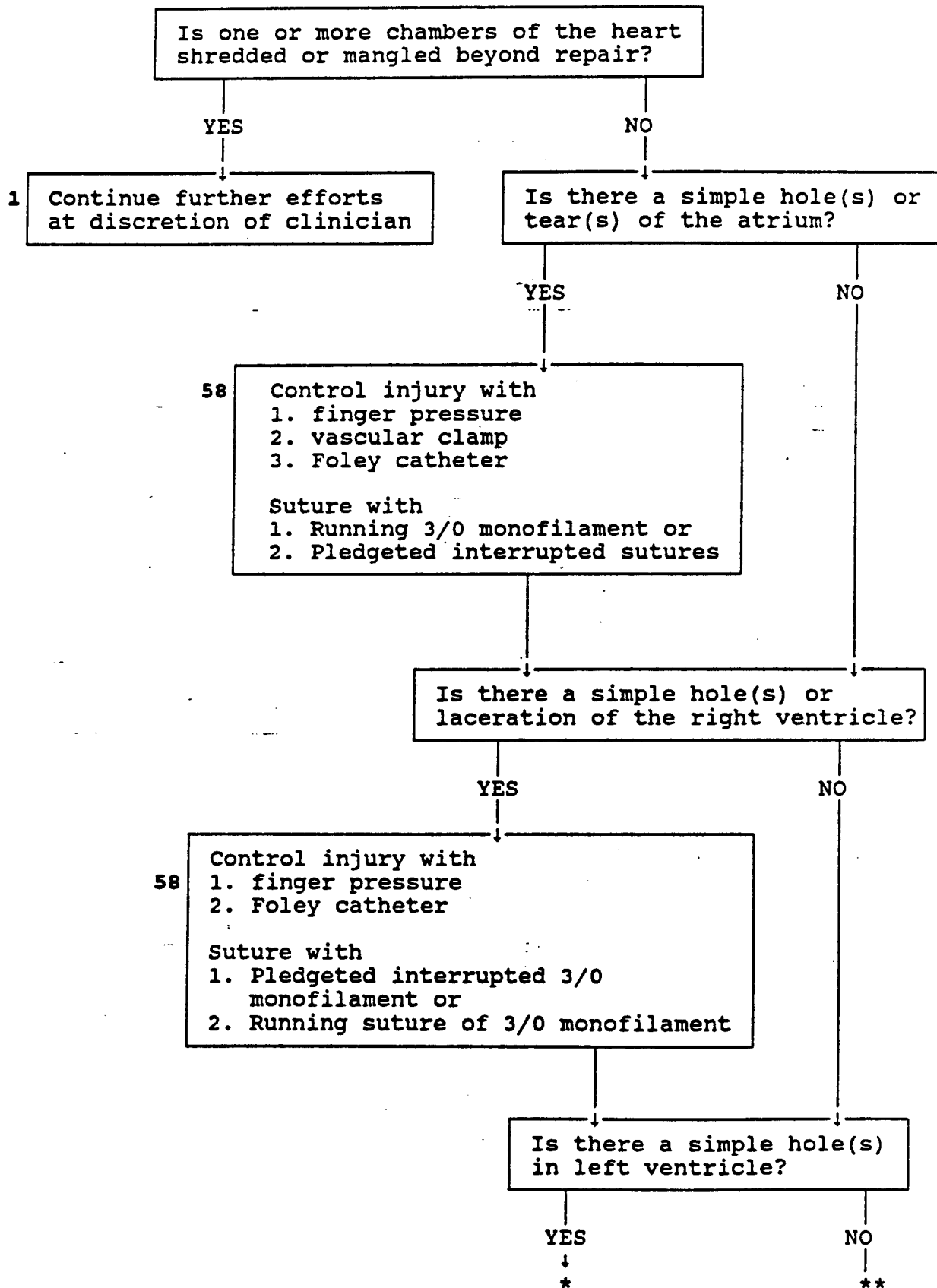
# BLEEDING INTO PERICARDIUM

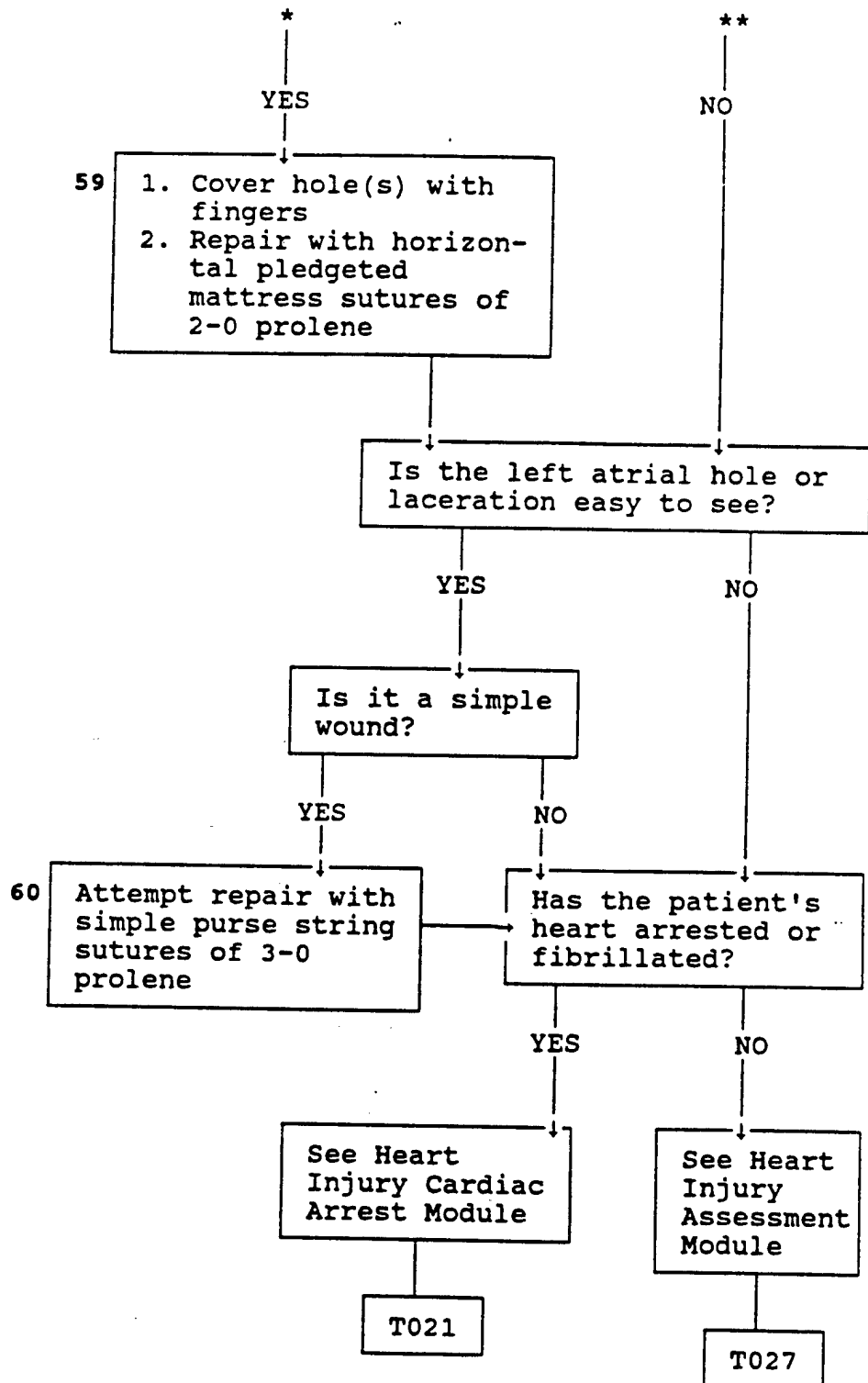
T019

1/1

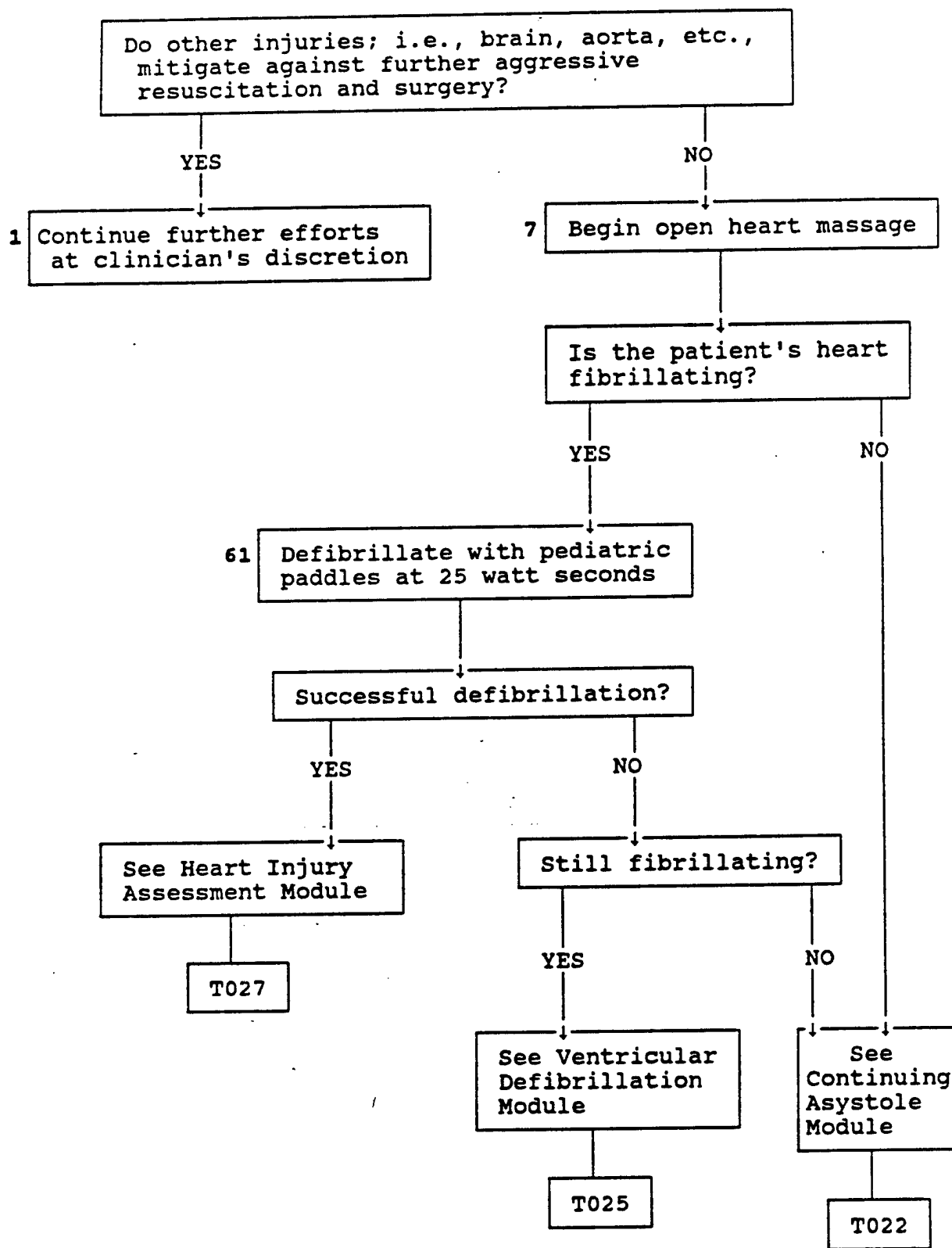


HOLE IN HEART EVALUATION MODULE

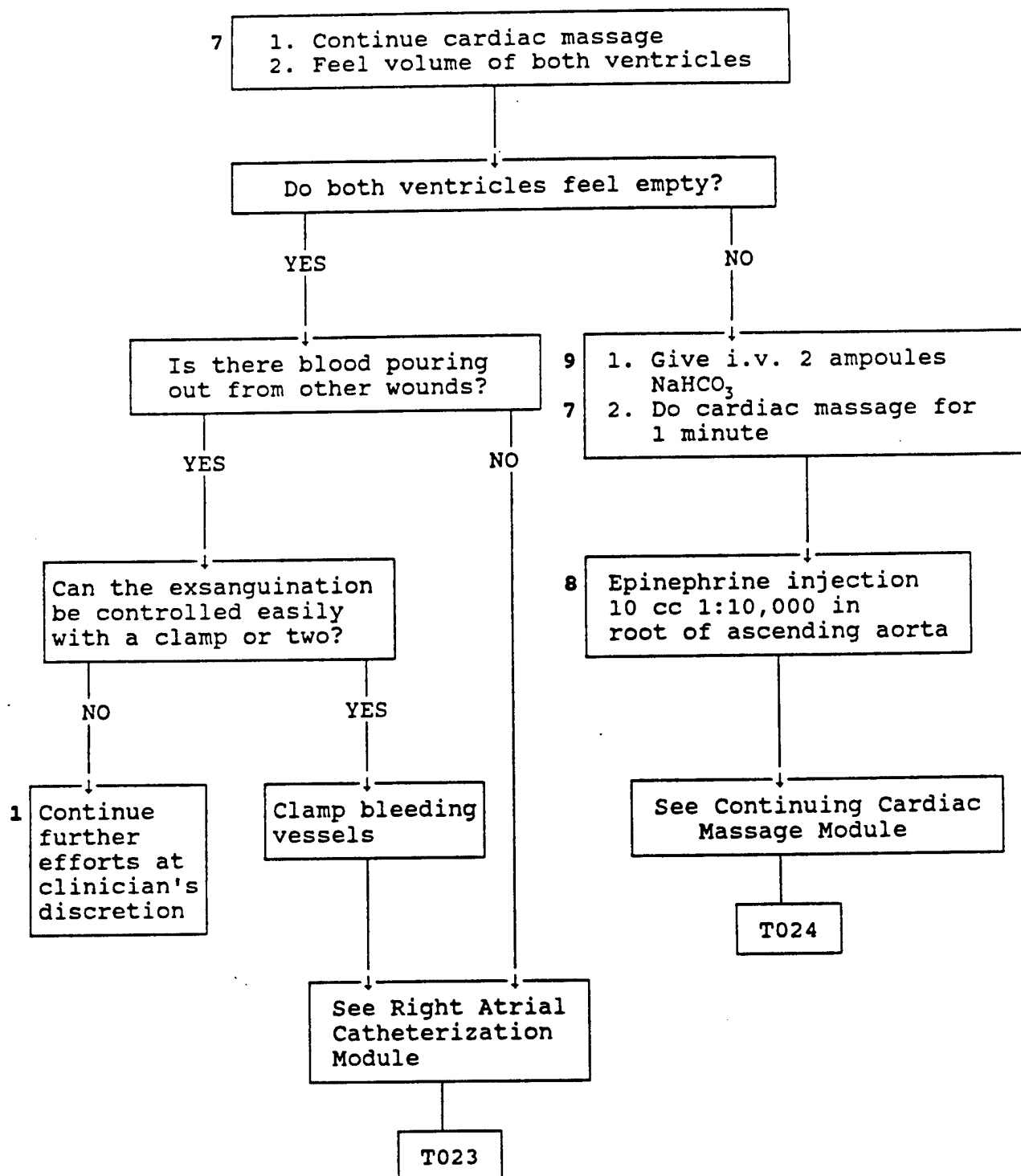




HEART INJURY CARDIAC ARREST MODULE



CONTINUING ASYSTOLE MODULE



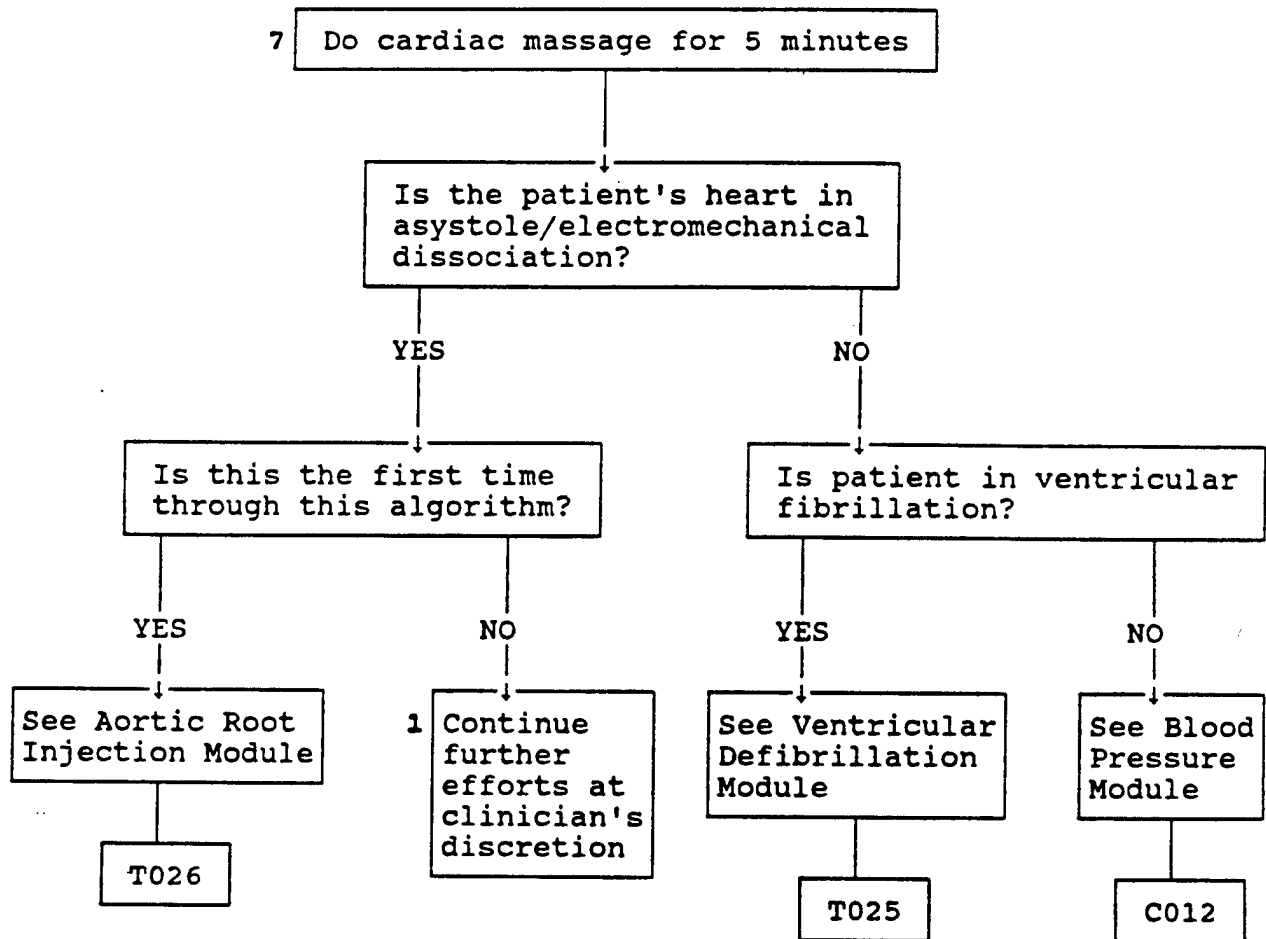
RIGHT ATRIAL CATHETERIZATION MODULE

- 62 1. Put purse string suture (#3-0 Tevdek)  
in right atrial appendage or atrium
2. Make a stab incision in middle of  
purse string and insert #18 pediatric  
feeding tube
- 63 3. Infuse packed cells as rapidly as  
possible

See Continuing Cardiac  
Massage Module

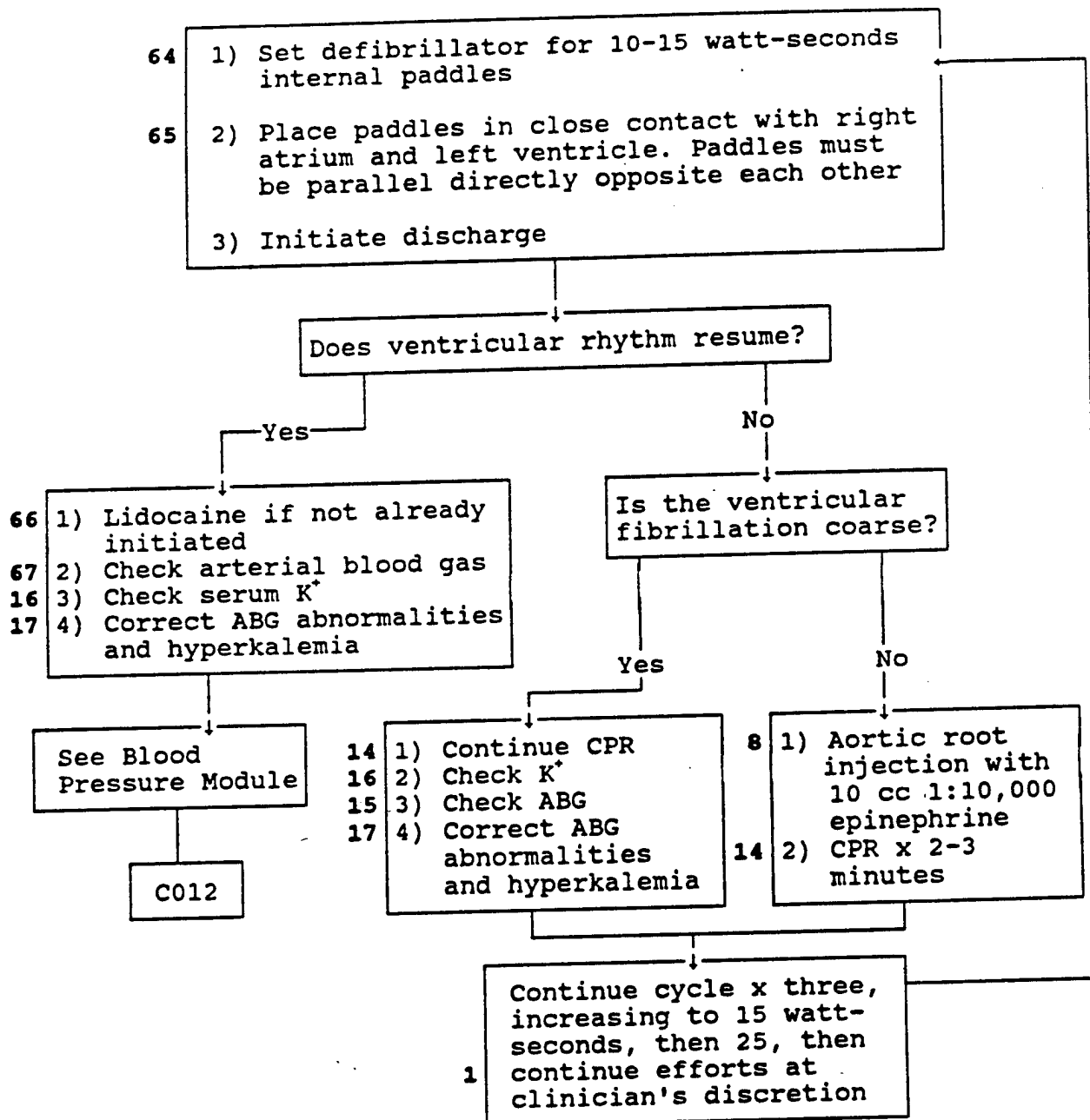
T024

CONTINUING CARDIAC MASSAGE MODULE

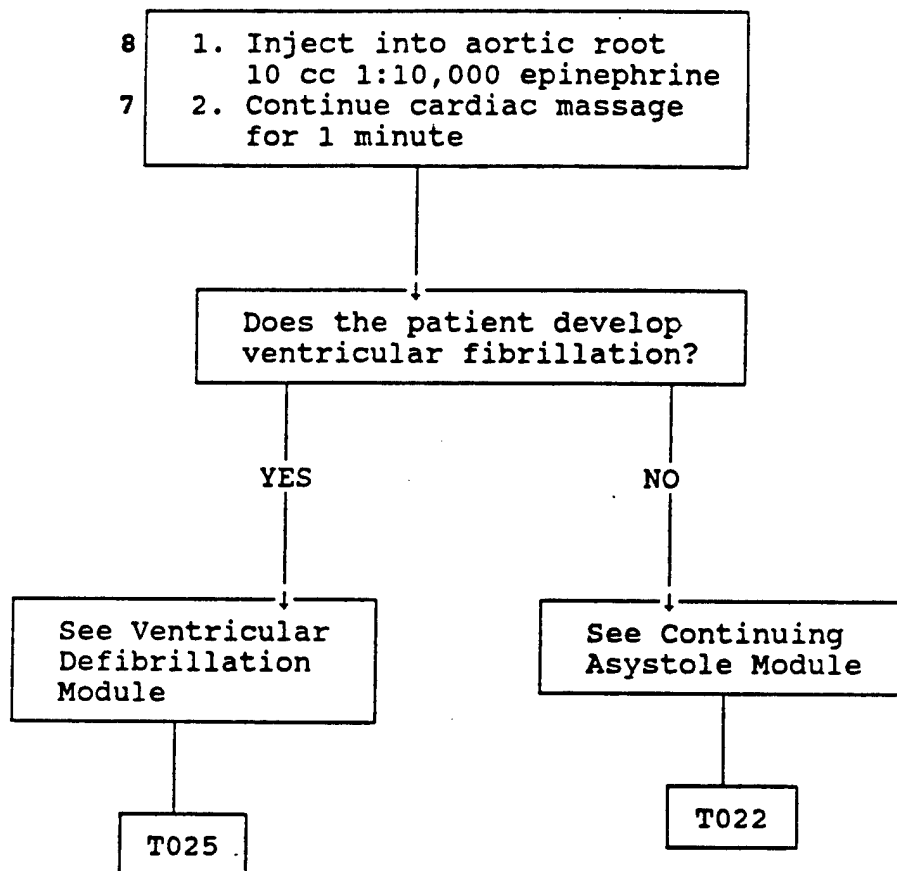




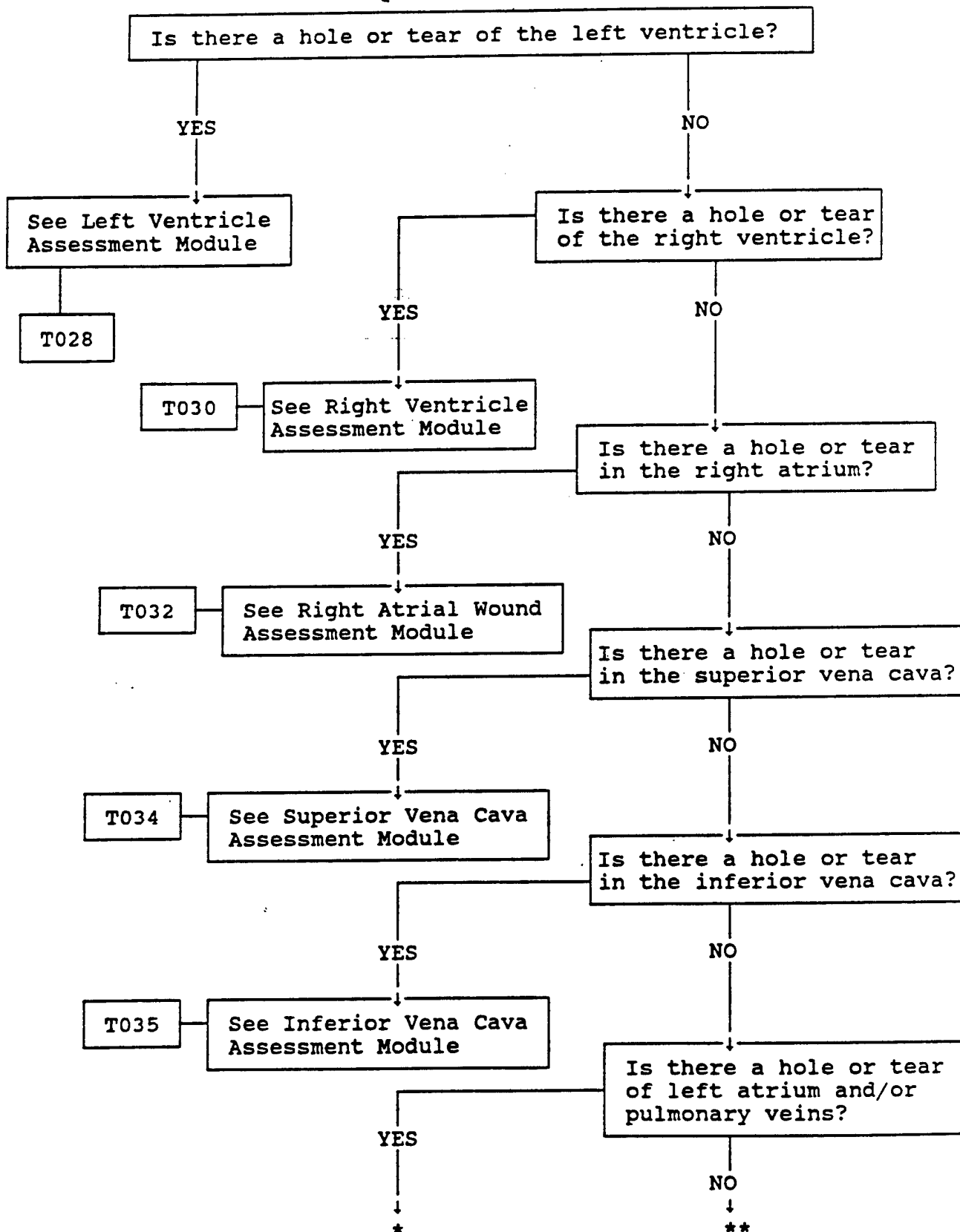
# VENTRICULAR DEFIBRILLATION

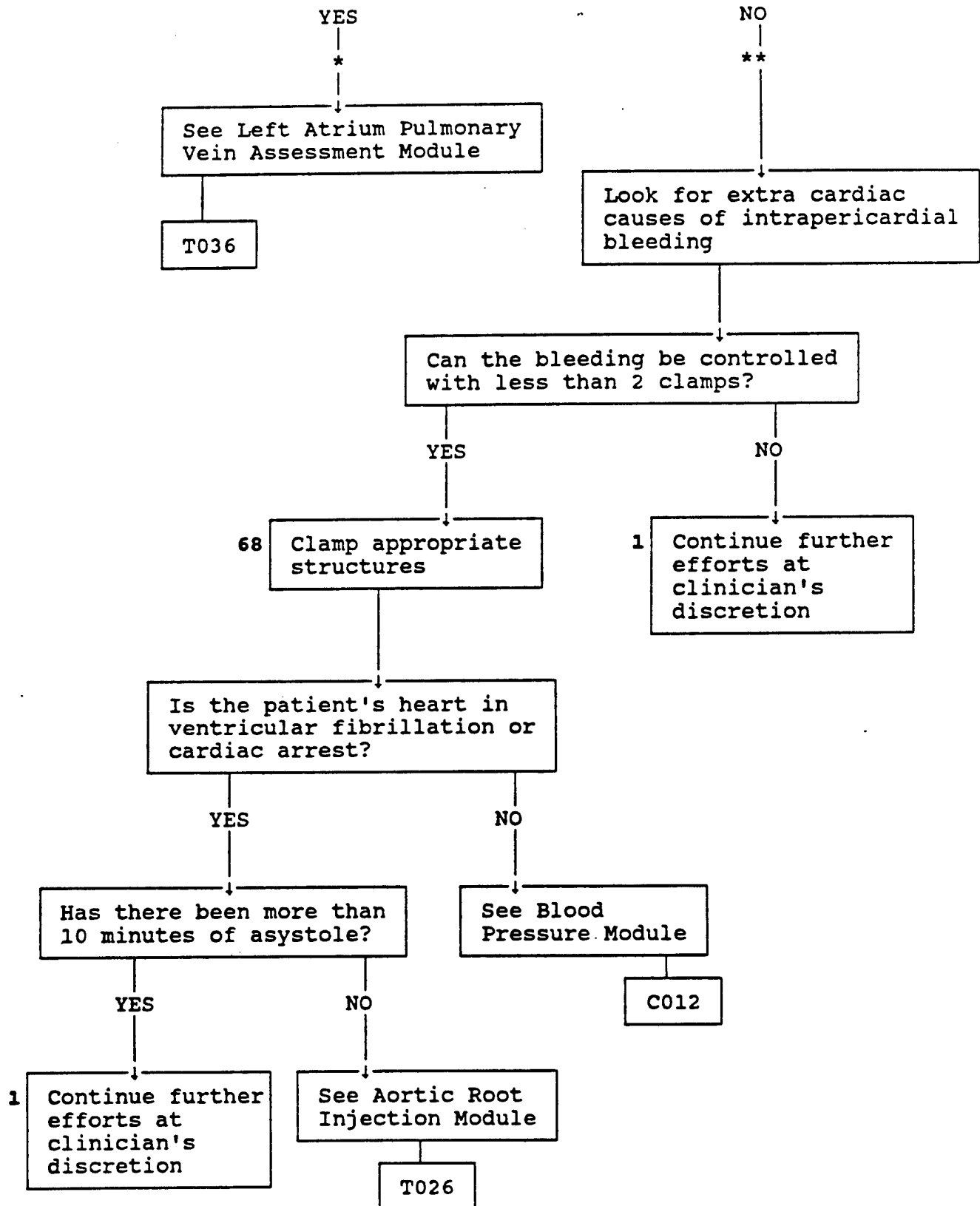


AORTIC ROOT INJECTION MODULE

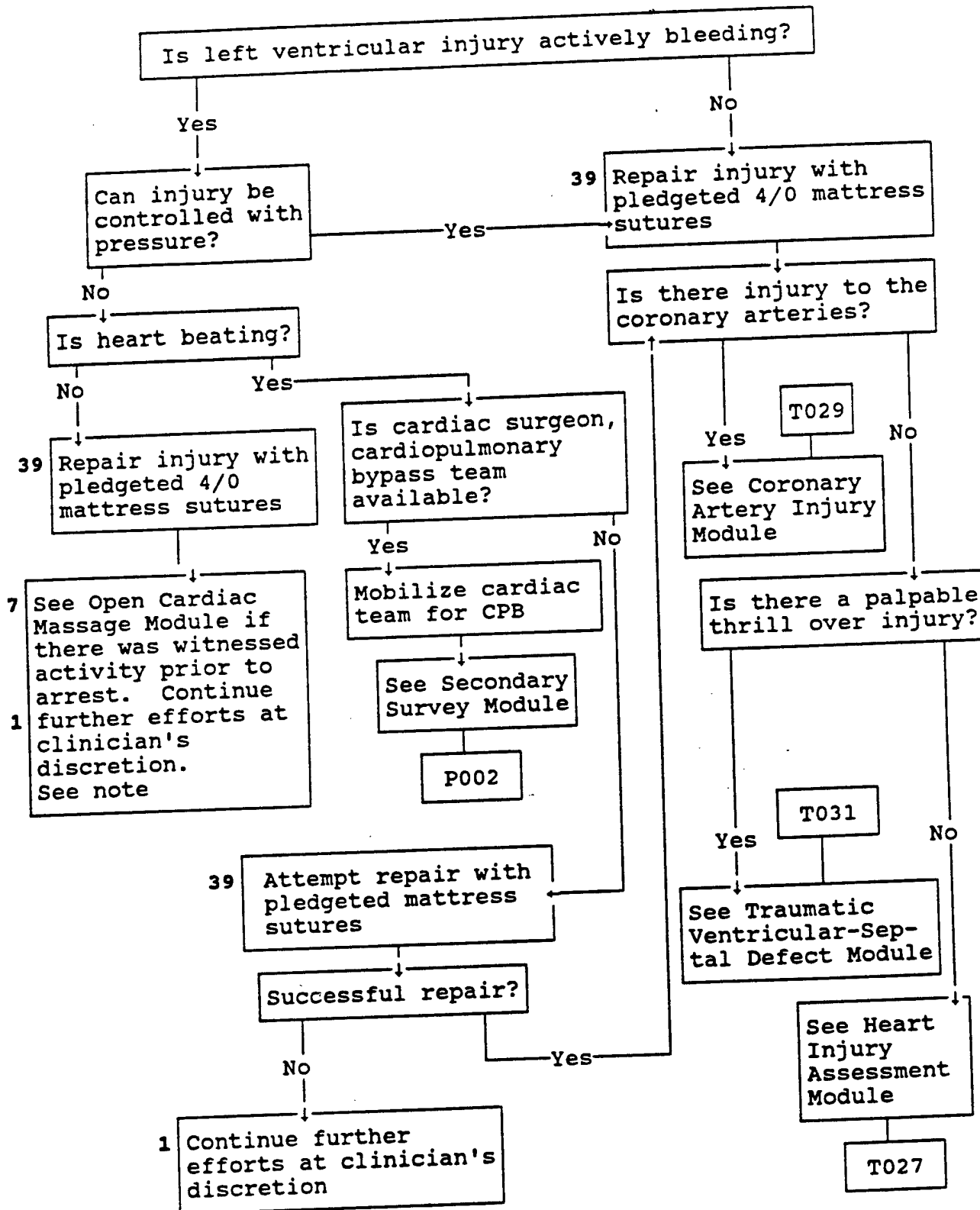


# HEART INJURY ASSESSMENT MODULE





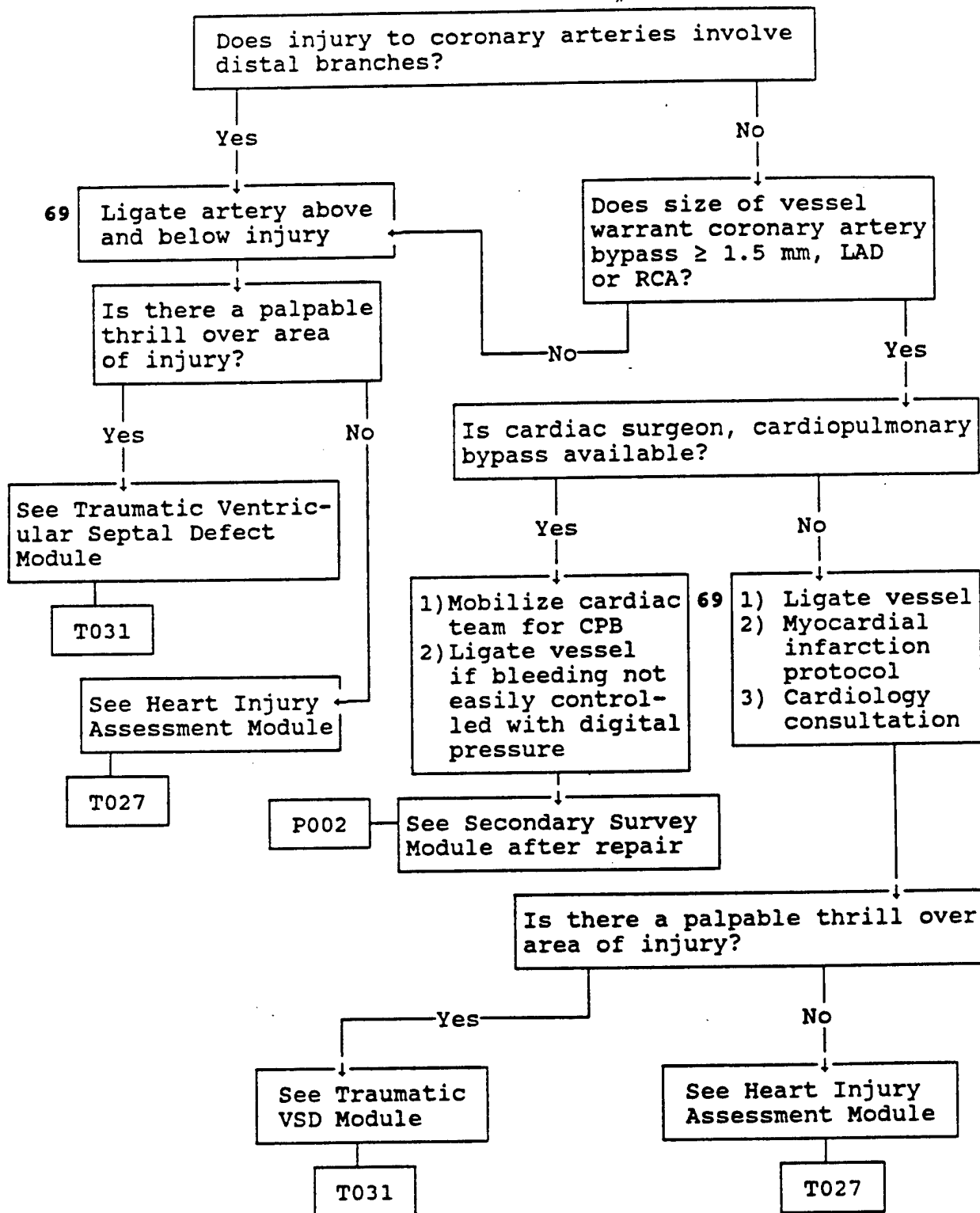
# LEFT VENTRICLE ASSESSMENT MODULE



Note: See T003 for Open Cardiac Massage Technique

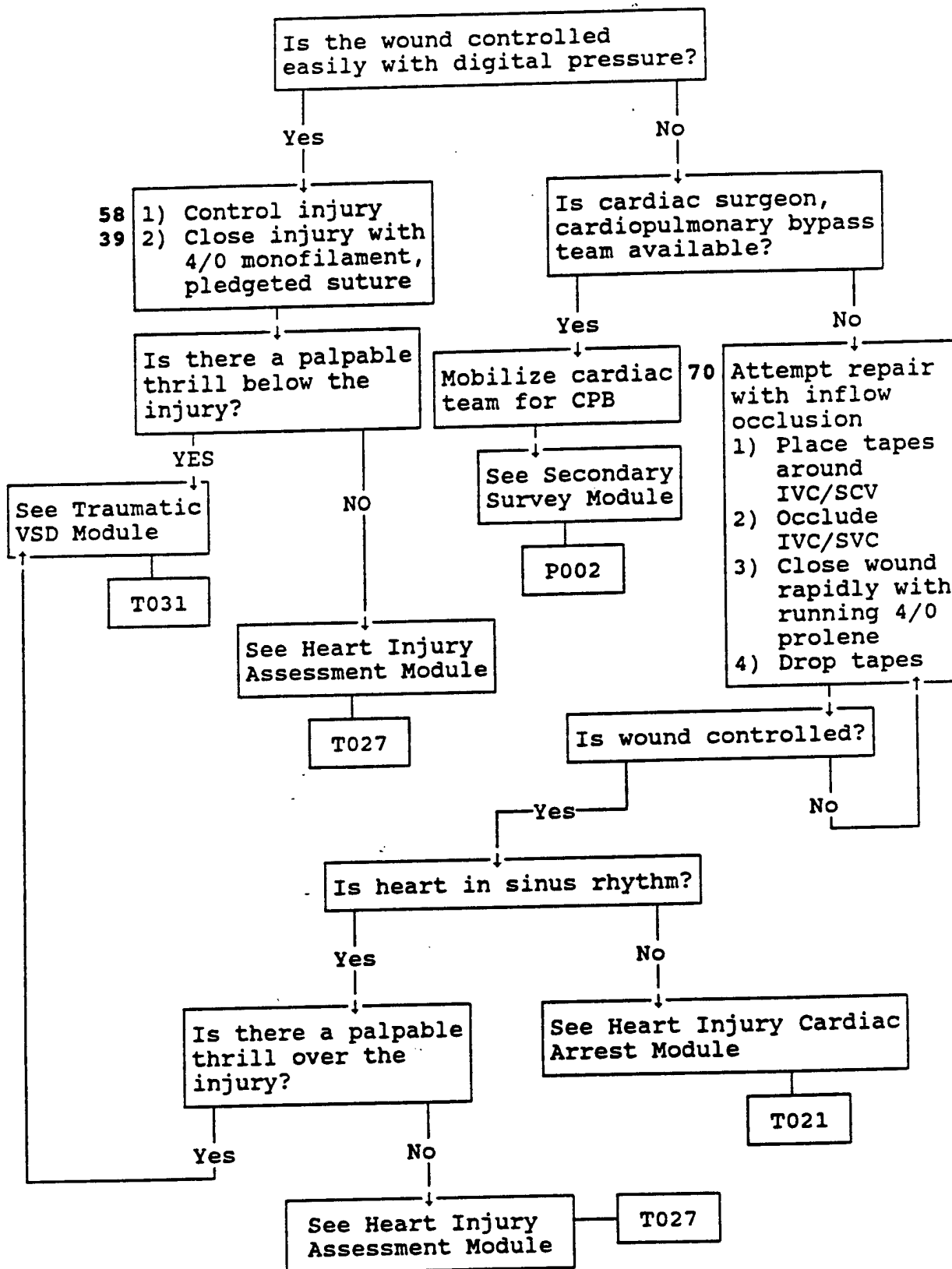
CORONARY ARTERY INJURY MODULE

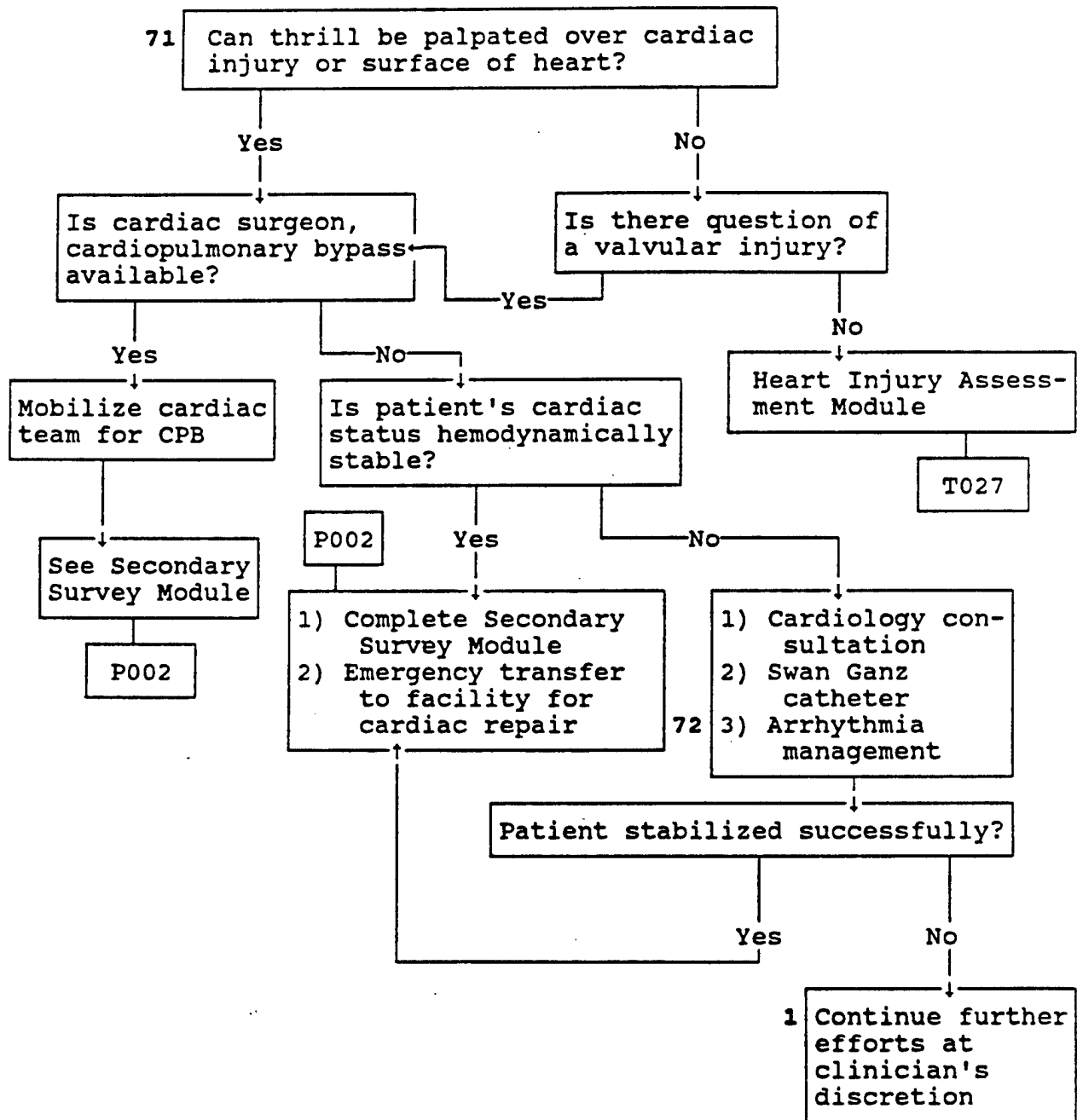
T029  
1/1



# RIGHT VENTRICLE ASSESSMENT MODULE

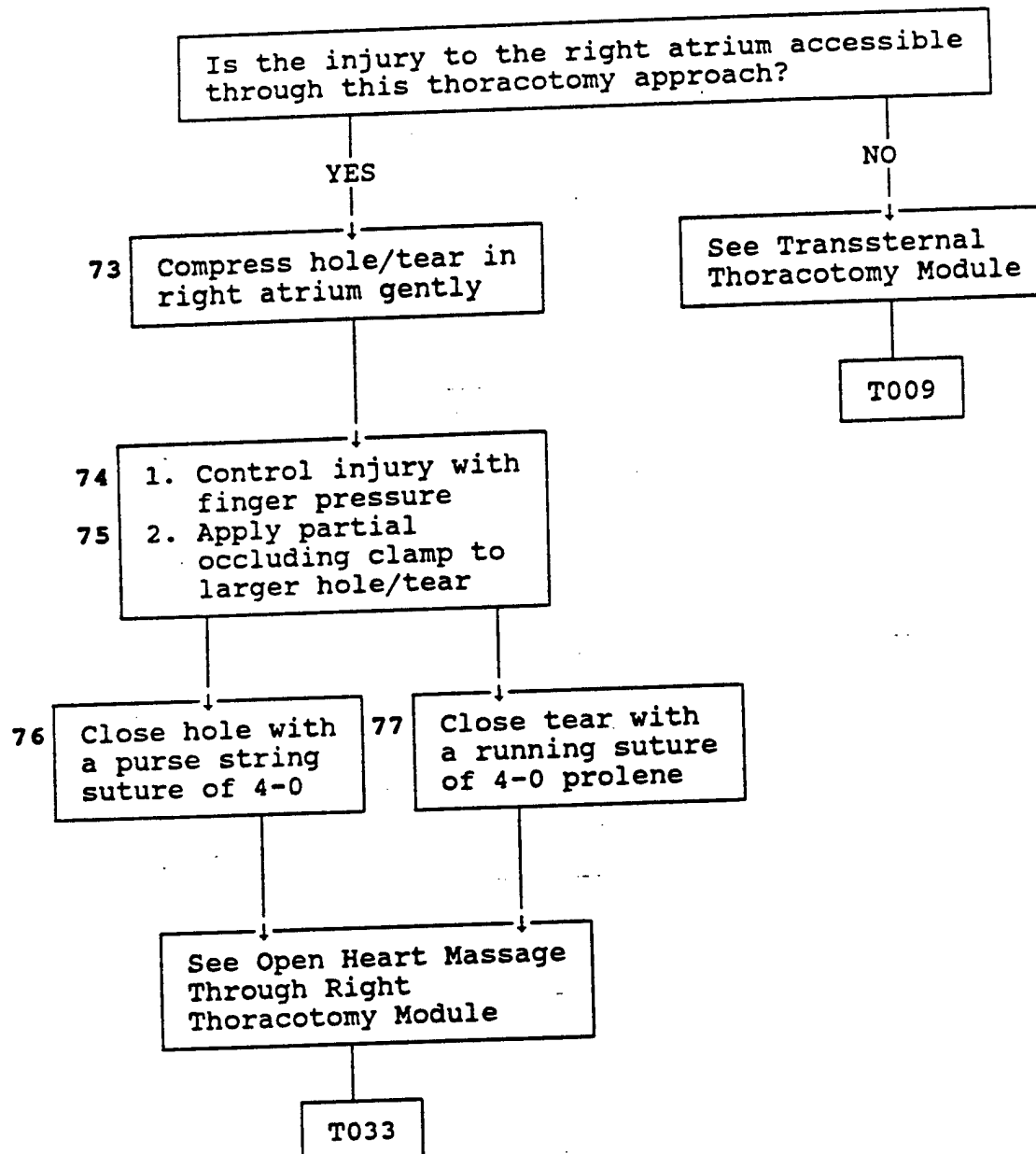
T030  
1/1



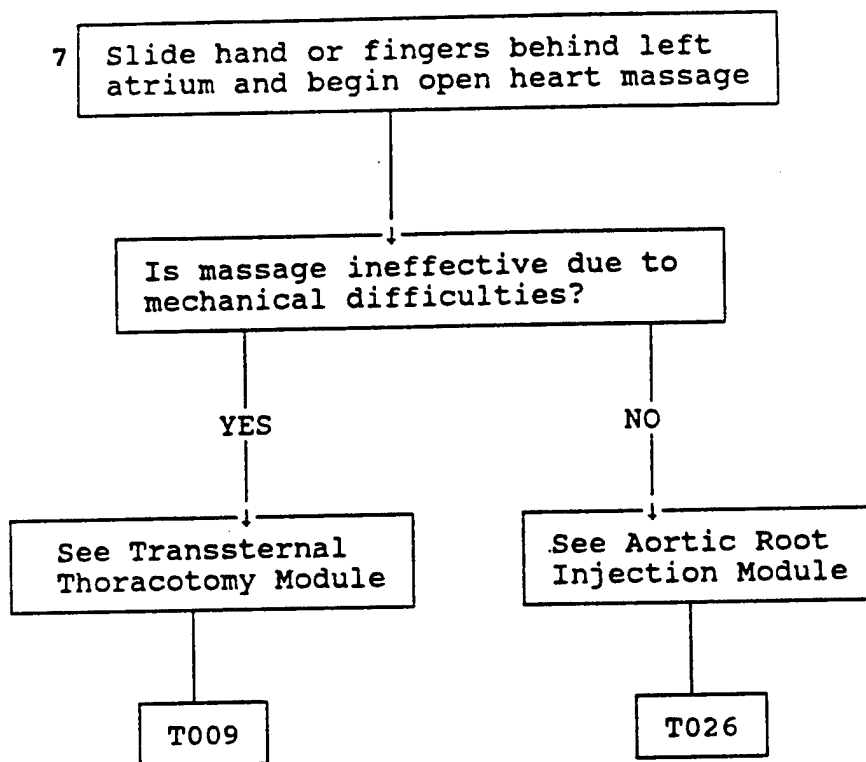




RIGHT ATRIAL WOUND ASSESSMENT MODULE

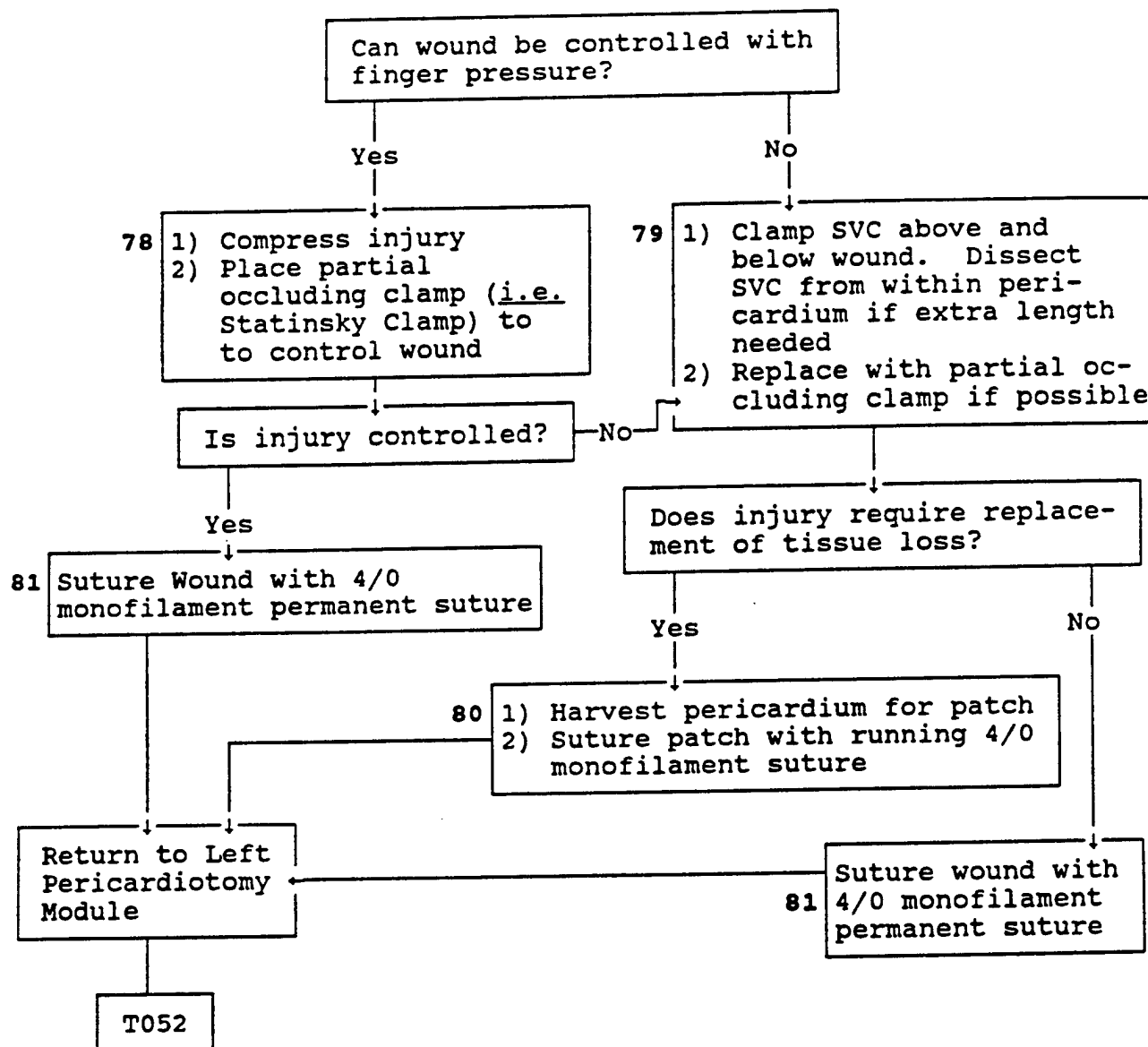


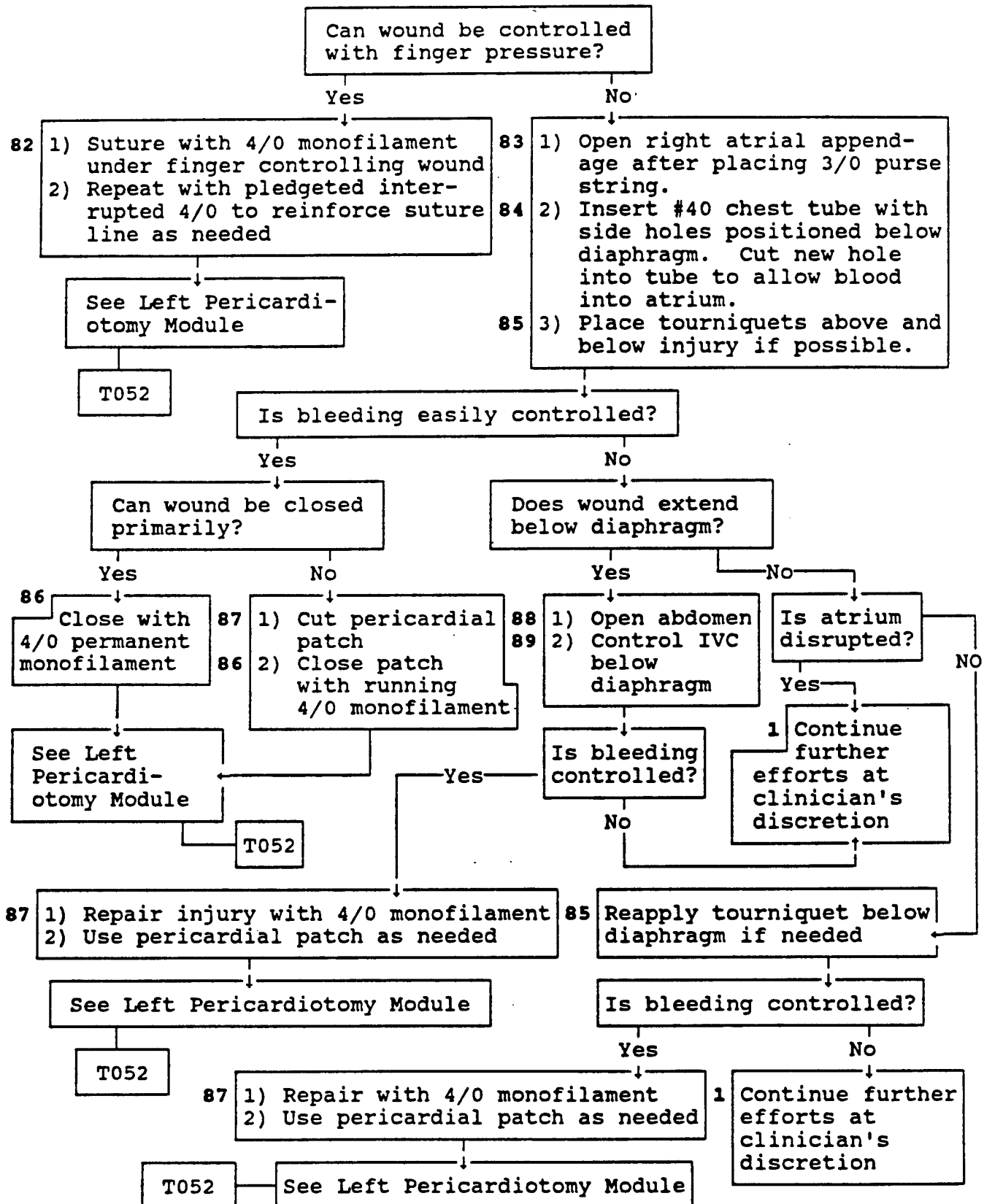
OPEN HEART MASSAGE THROUGH RIGHT THORACOTOMY MODULE



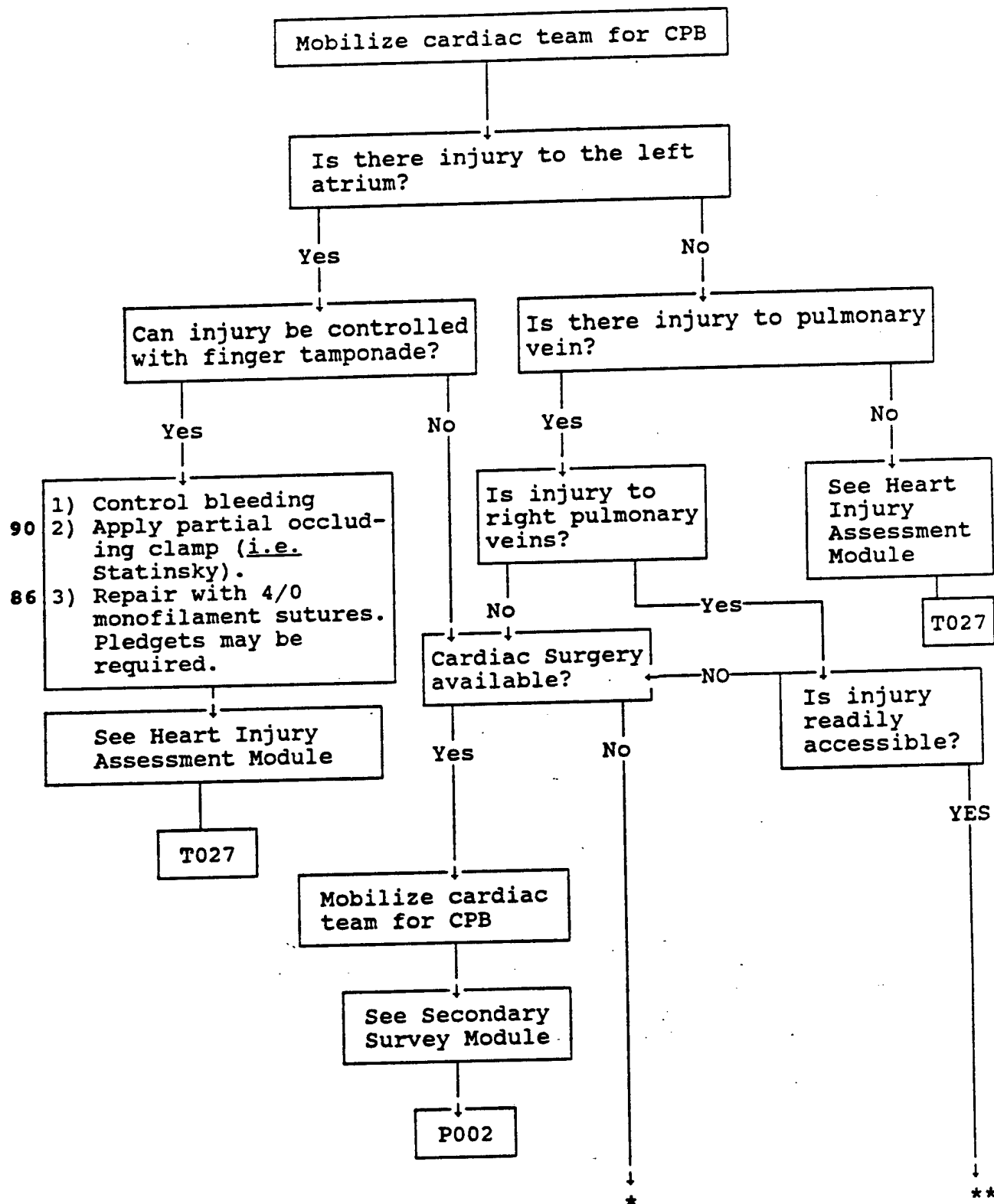
SUPERIOR VENA CAVA WOUND ASSESSMENT MODULE

T034  
1/1

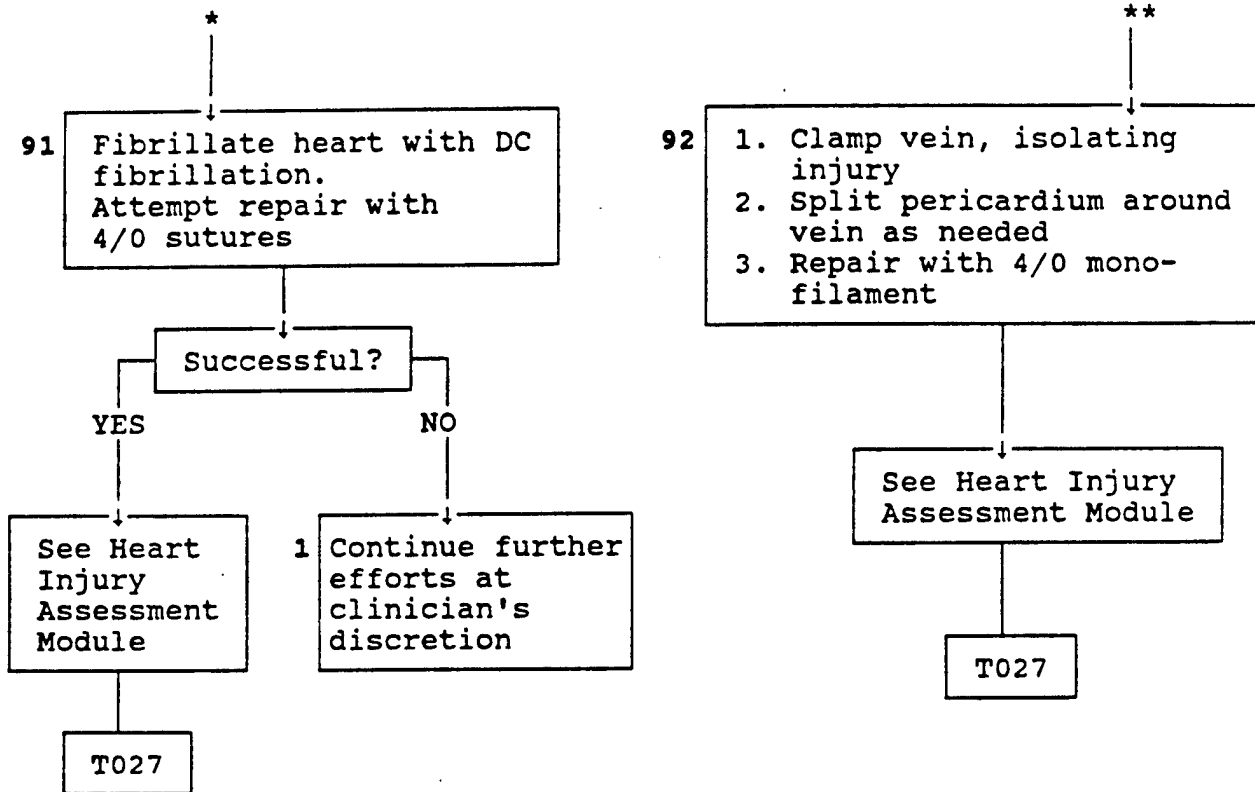




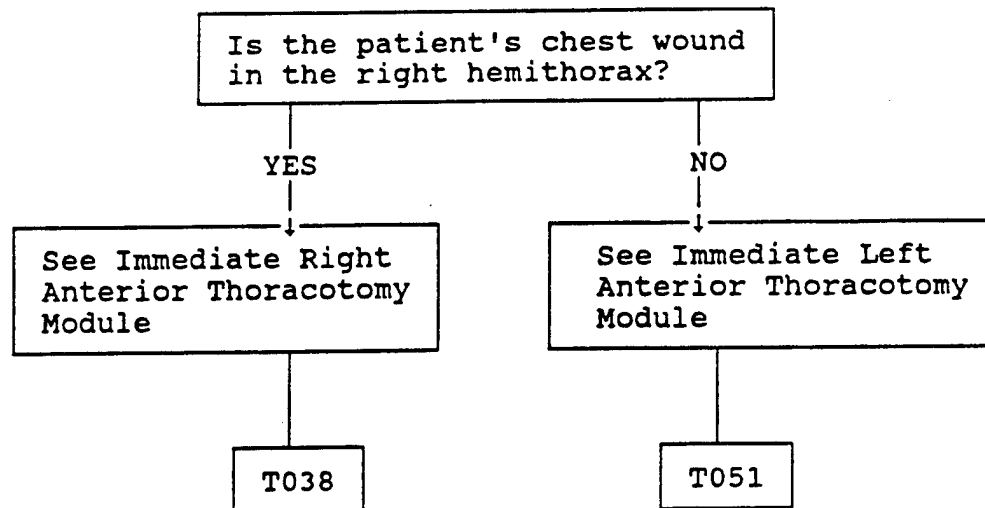
LEFT ATRIUM PULMONARY VEIN  
ASSESSMENT MODULE



LEFT ATRIUM PULMONARY VEIN  
ASSESSMENT MODULE



THORACOTOMY ON SAME SIDE OF WOUND MODULE



IMMEDIATE RIGHT ANTERIOR THORACOTOMY MODULE

93

1. Make an incision from right parasternal area 5th intercostal space to midaxillary line
2. With the cautery setting at 50 watts for coagulation and cutting, extend incision down to superior border of 6th rib and enter right pleural space over superior border of right 6th rib. As the right sternal border is approached, cauterize the intercostal muscles between the 5th and 6th costal chondral junctions
3. Hemoclip the right internal mammary artery and vein in continuity and divide
4. Insert a chest retractor into 5th intercostal space and open widely for 5-6 inches

Is there an injury to the pericardium  
or evidence of cardiac tamponade?

YES

See Right Pericardiotomy  
Module

T039

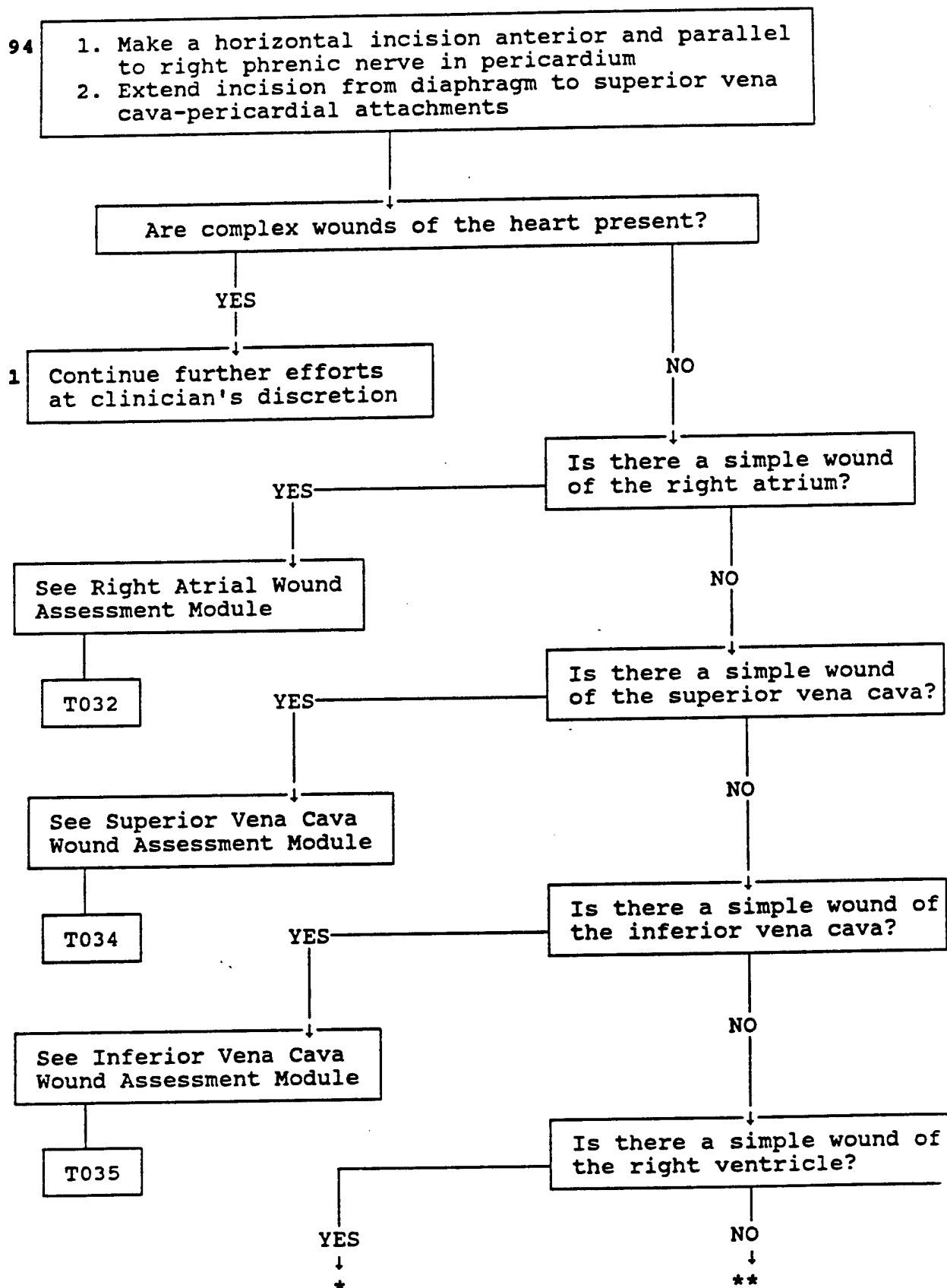
NO

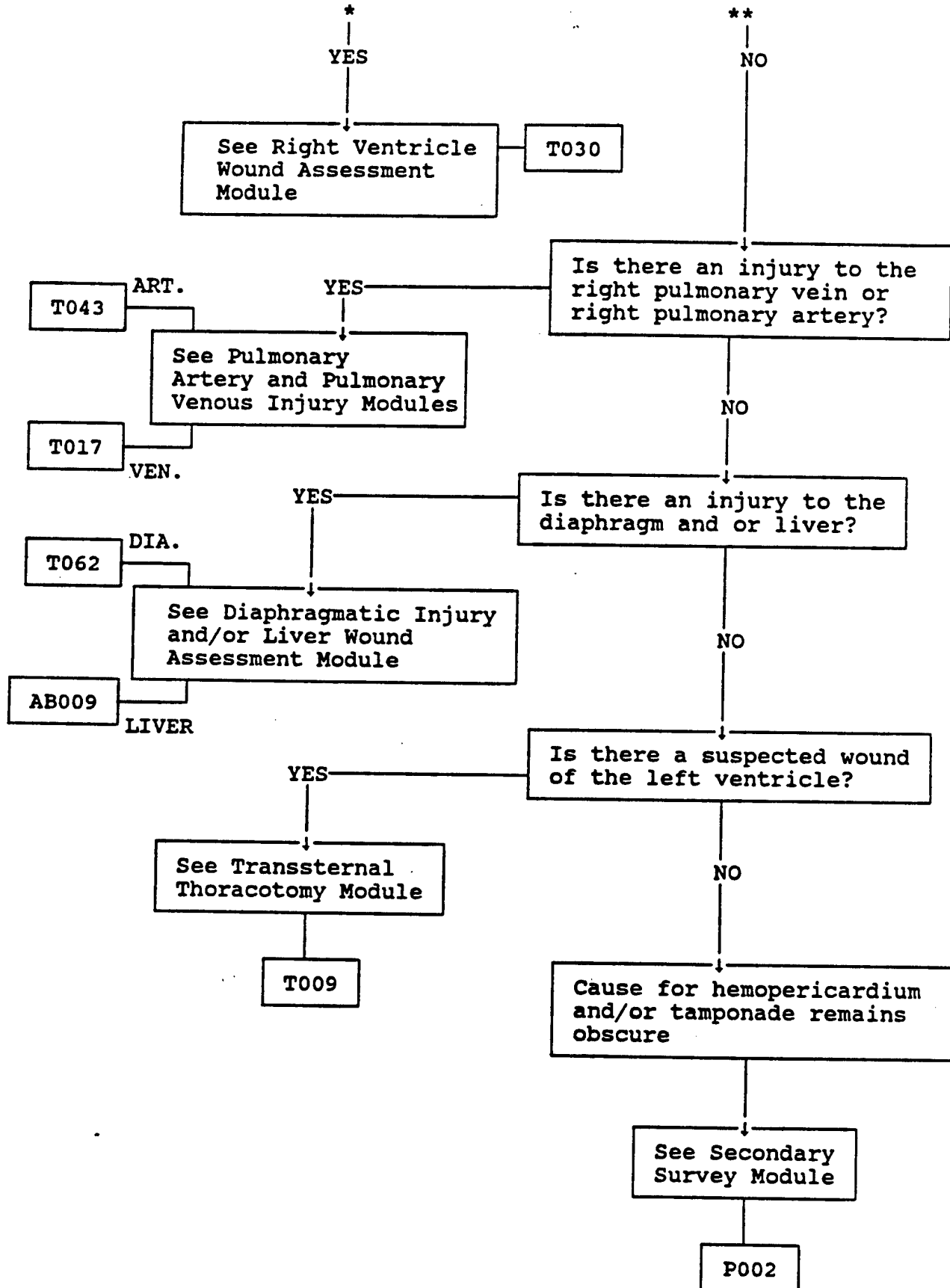
See Right Anterior Thora-  
cotomy Exploration Module

T040

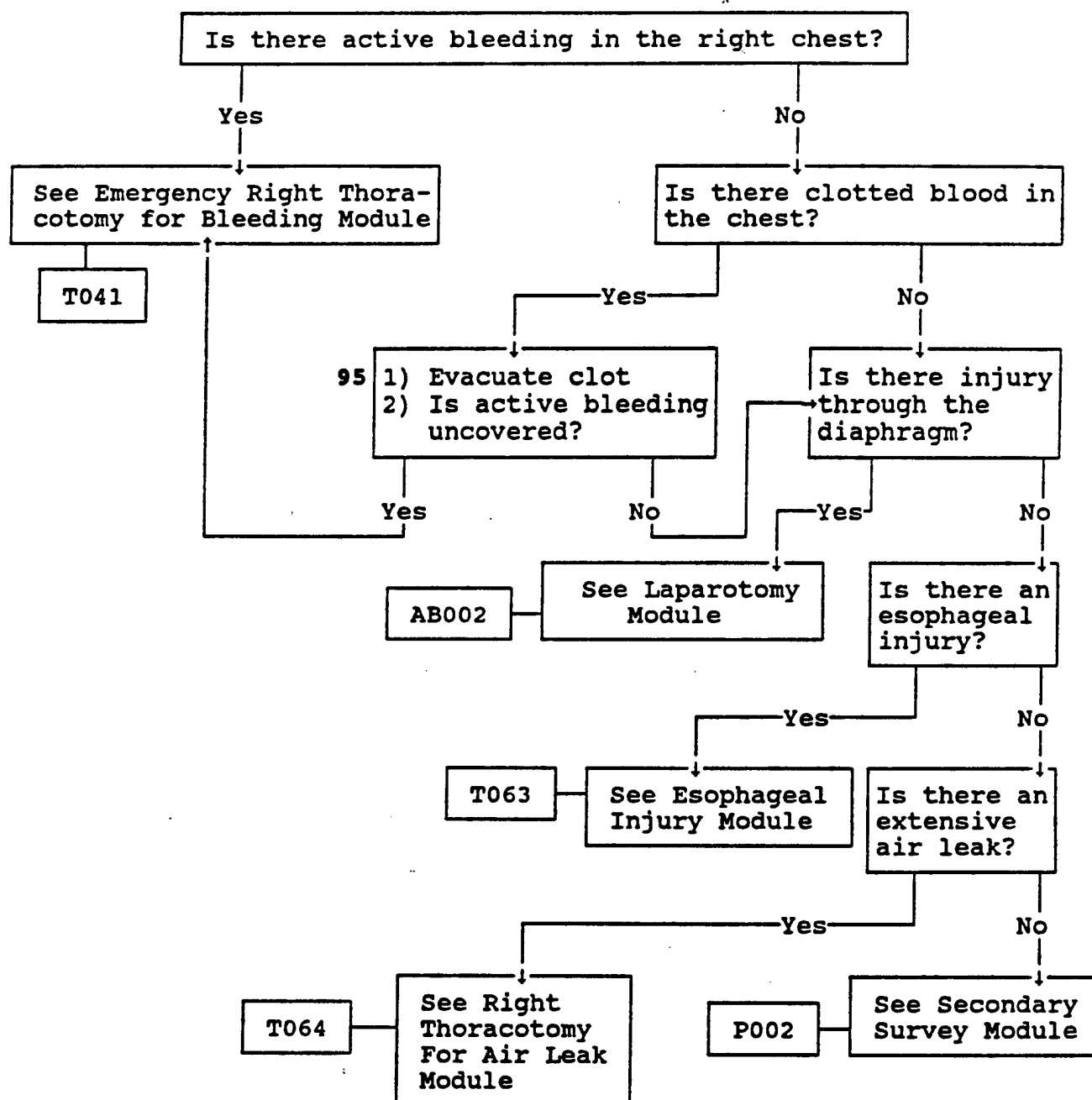


RIGHT PERICARDIOTOMY MODULE

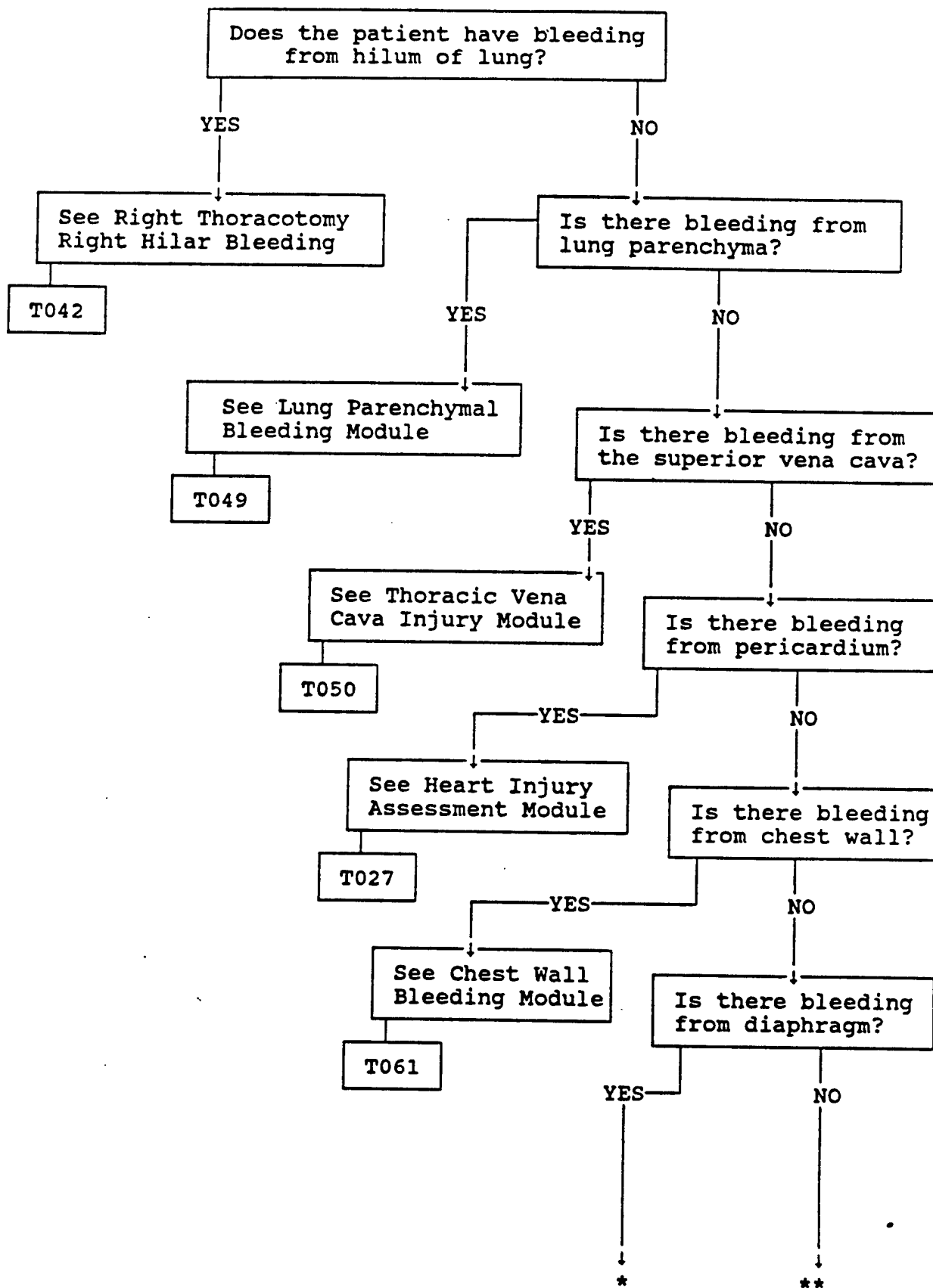


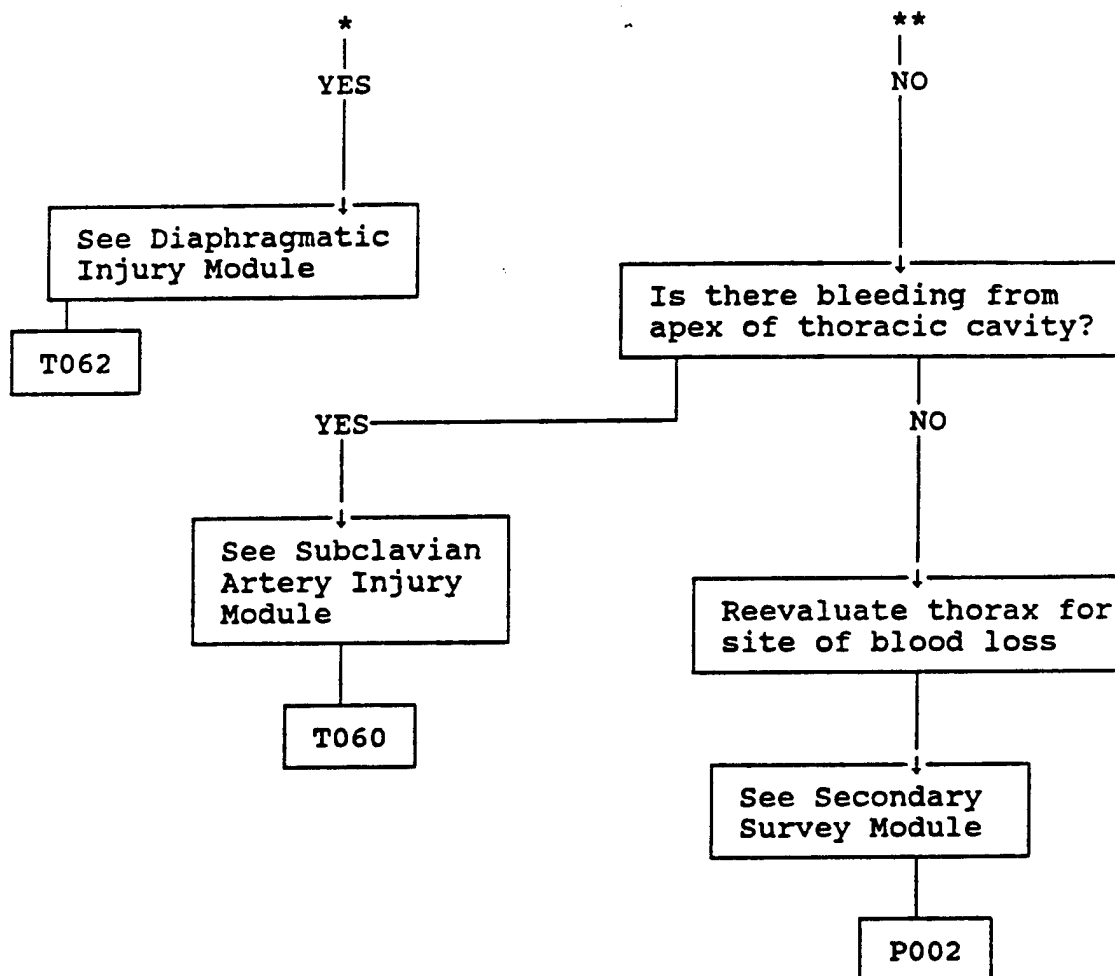


RIGHT ANTERIOR THORACOTOMY EXPLORATION MODULE

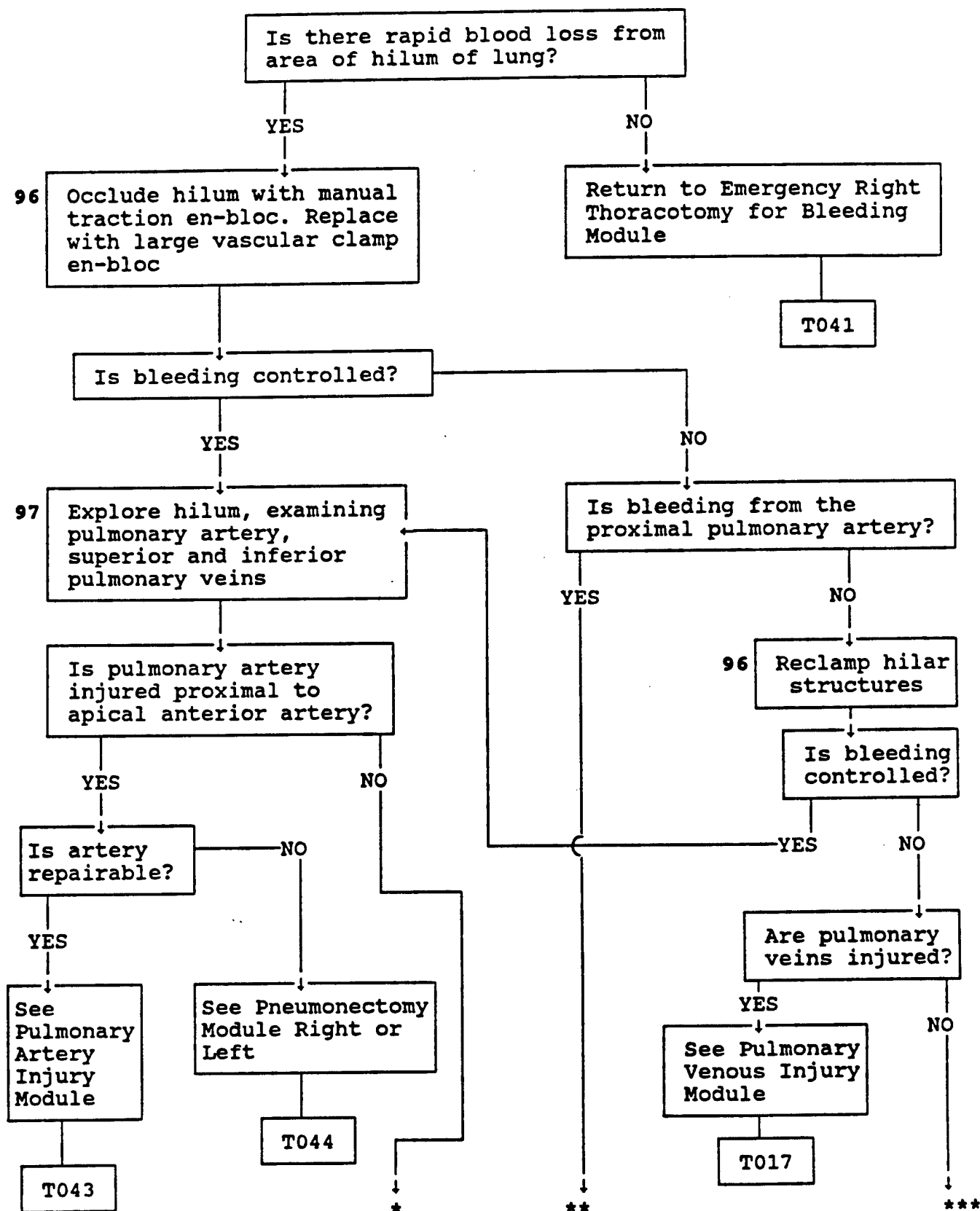


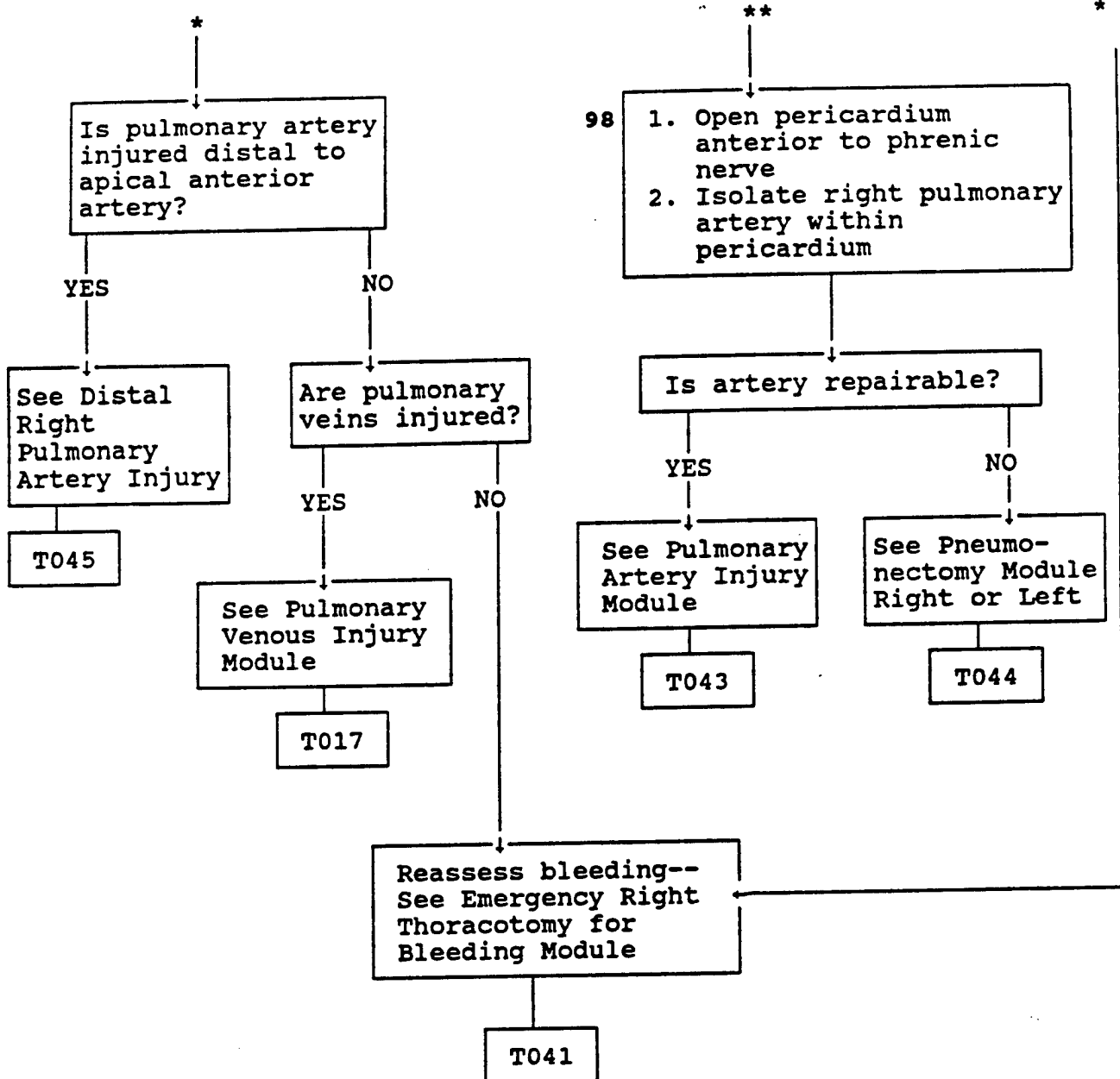
EMERGENCY RIGHT THORACOTOMY FOR BLEEDING MODULE



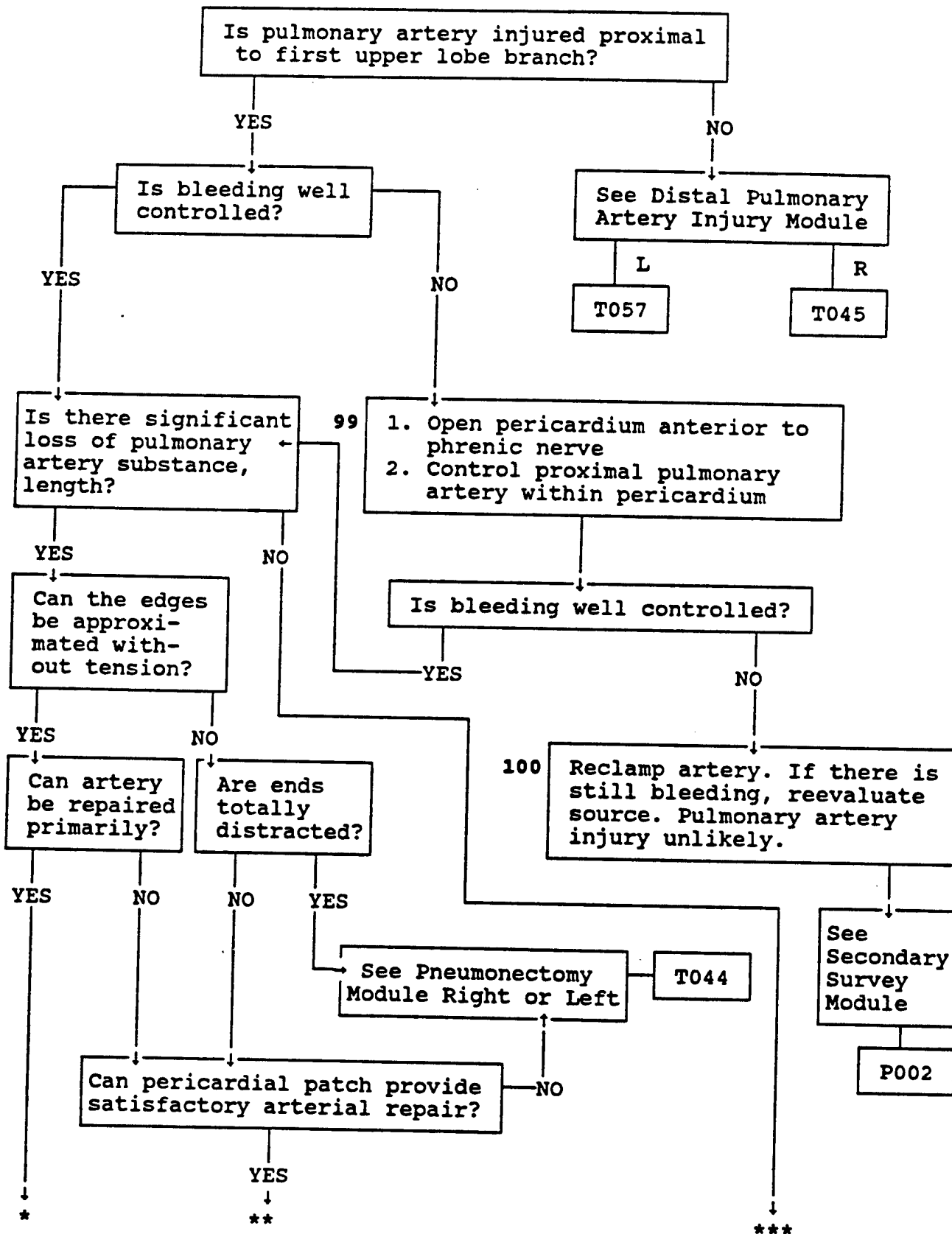


RIGHT THORACOTOMY RIGHT HILAR BLEEDING MODULE

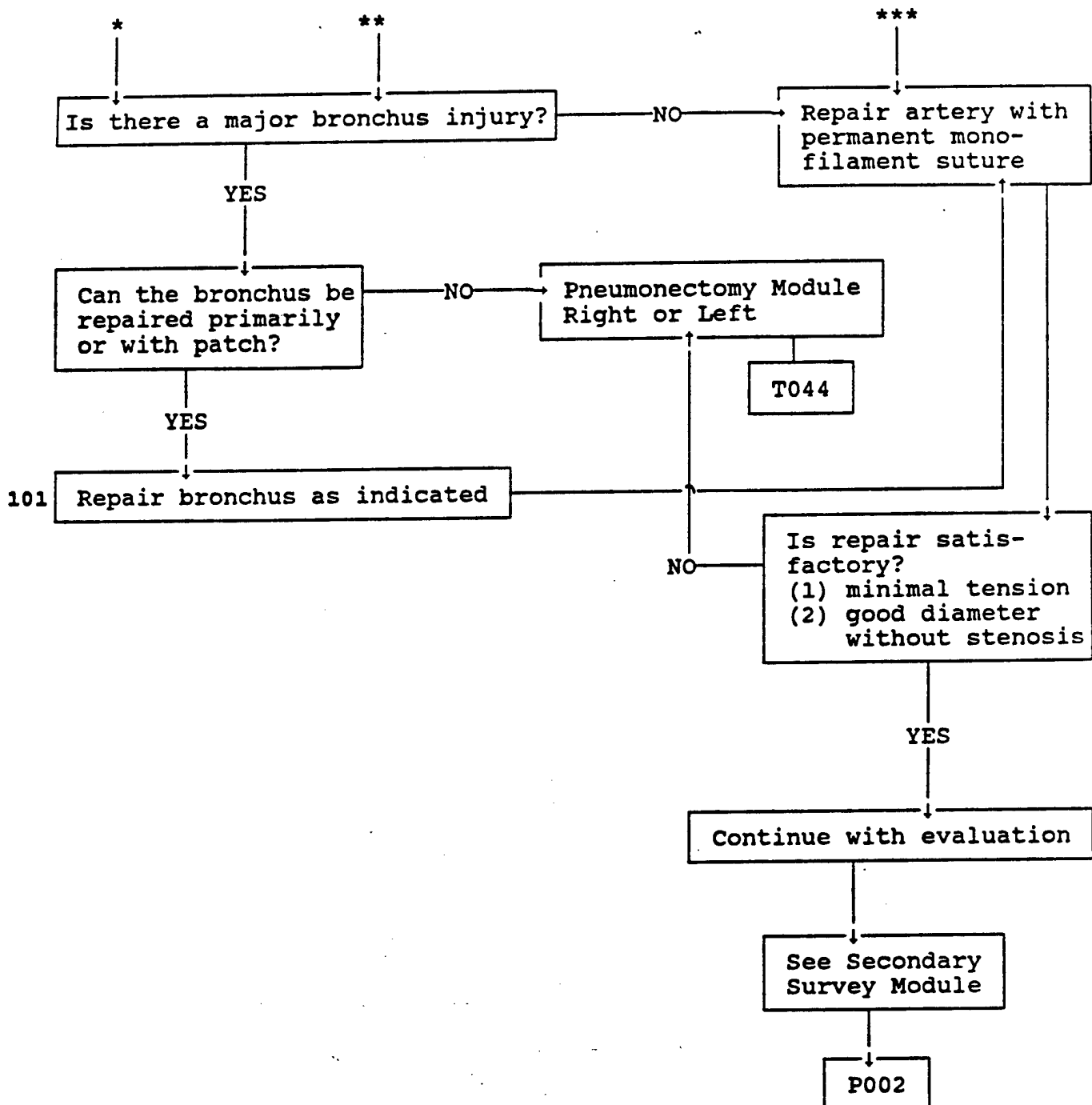




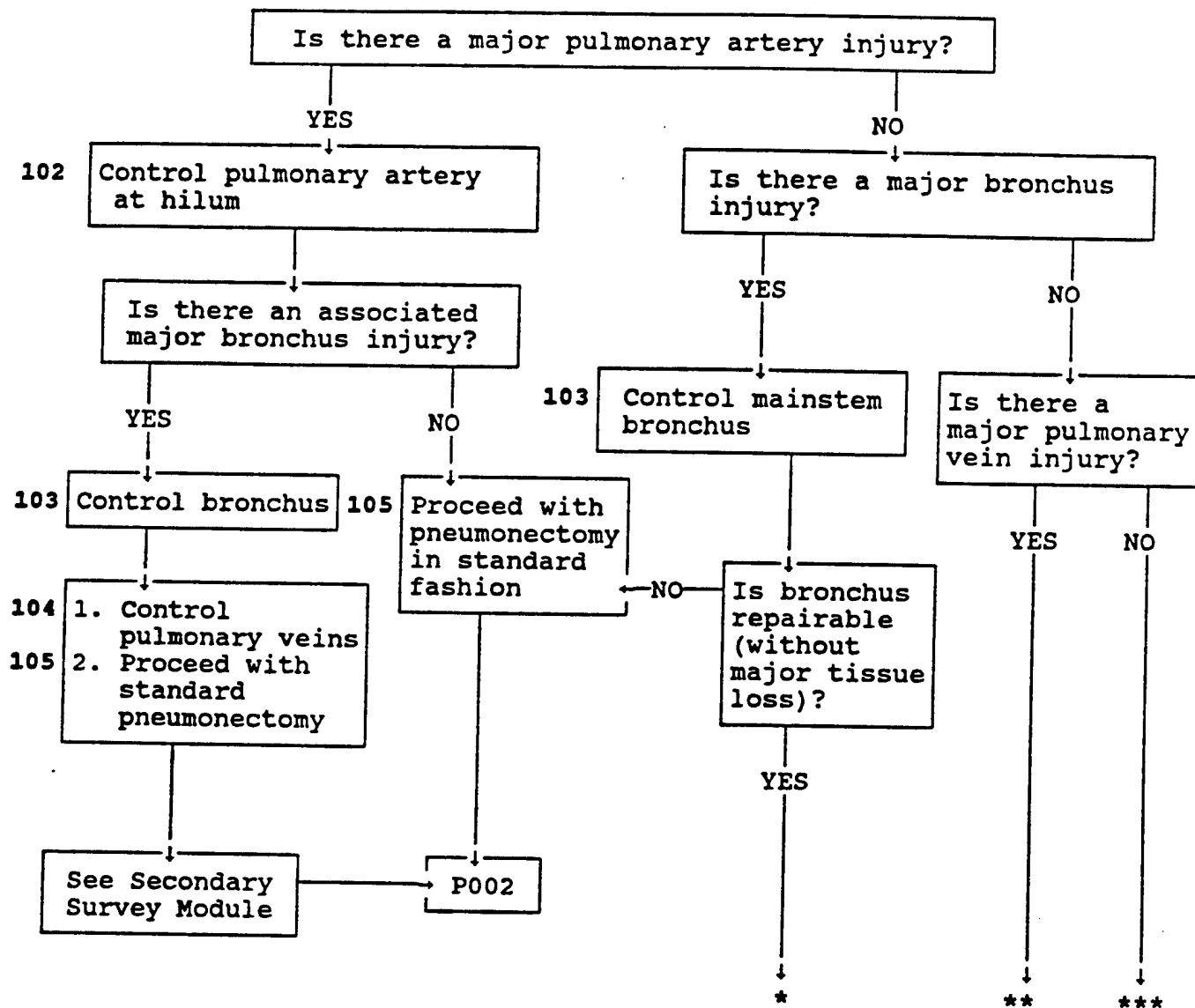
PULMONARY ARTERY INJURY MODULE

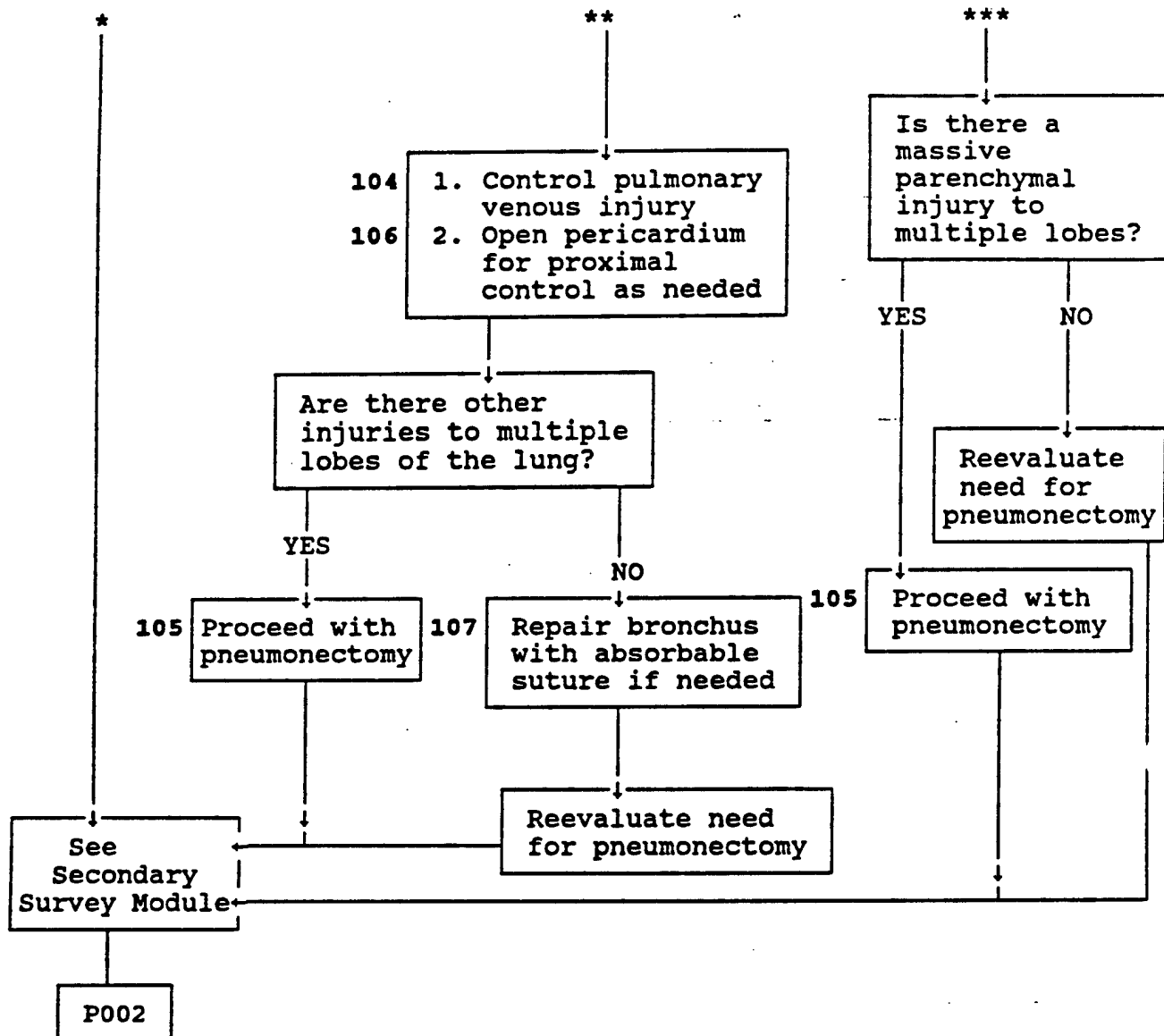




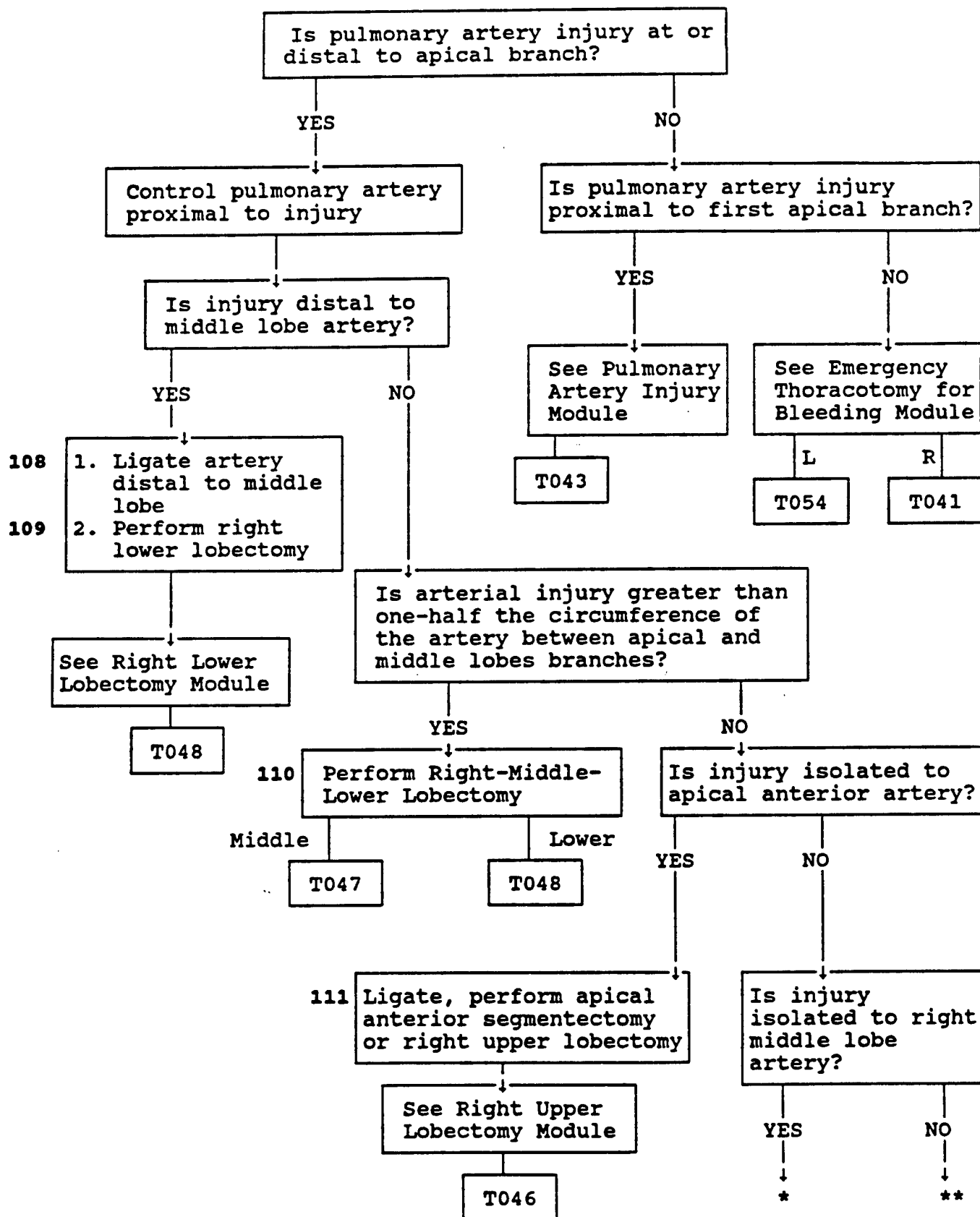


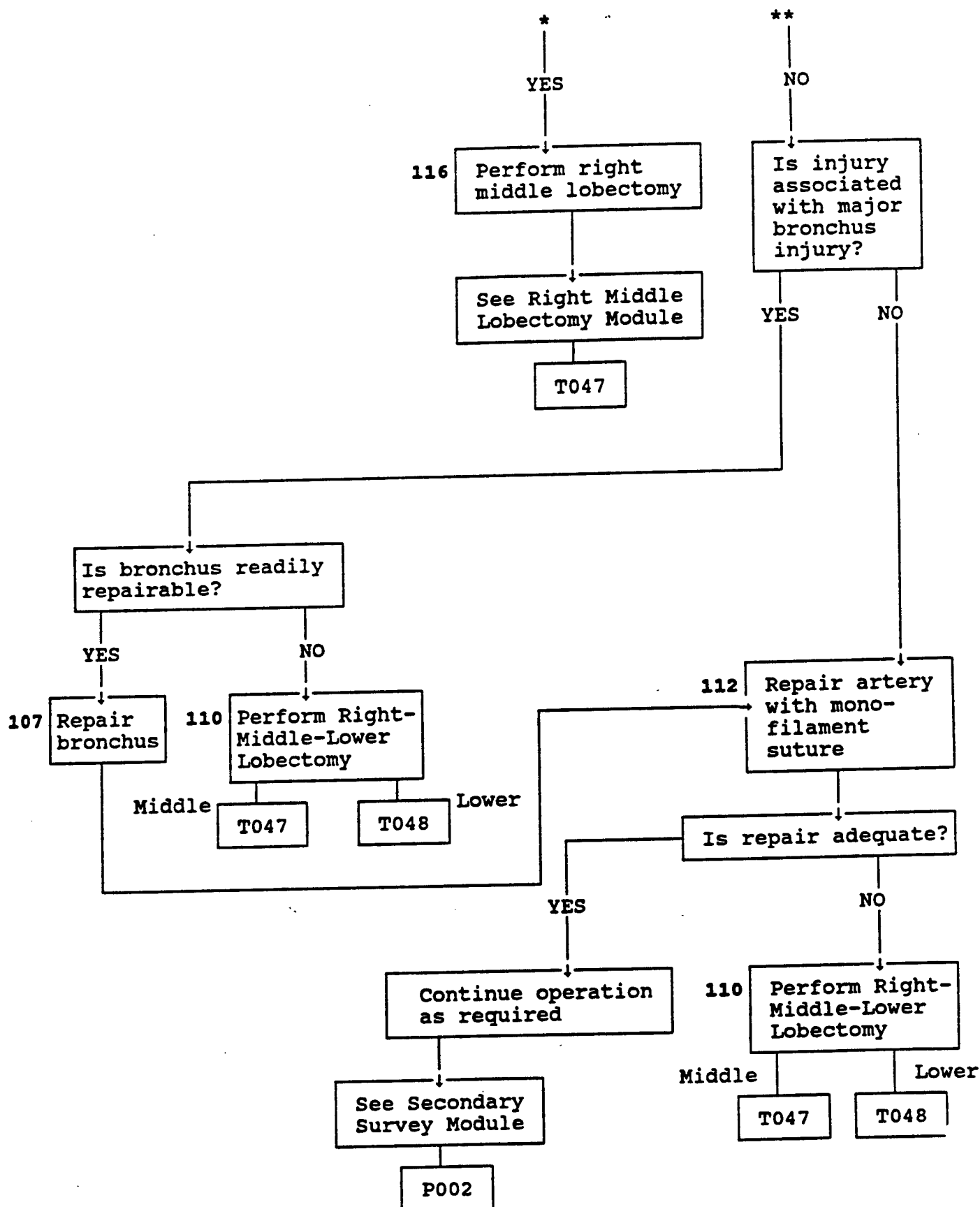
PNEUMONECTOMY MODULE  
RIGHT OR LEFT



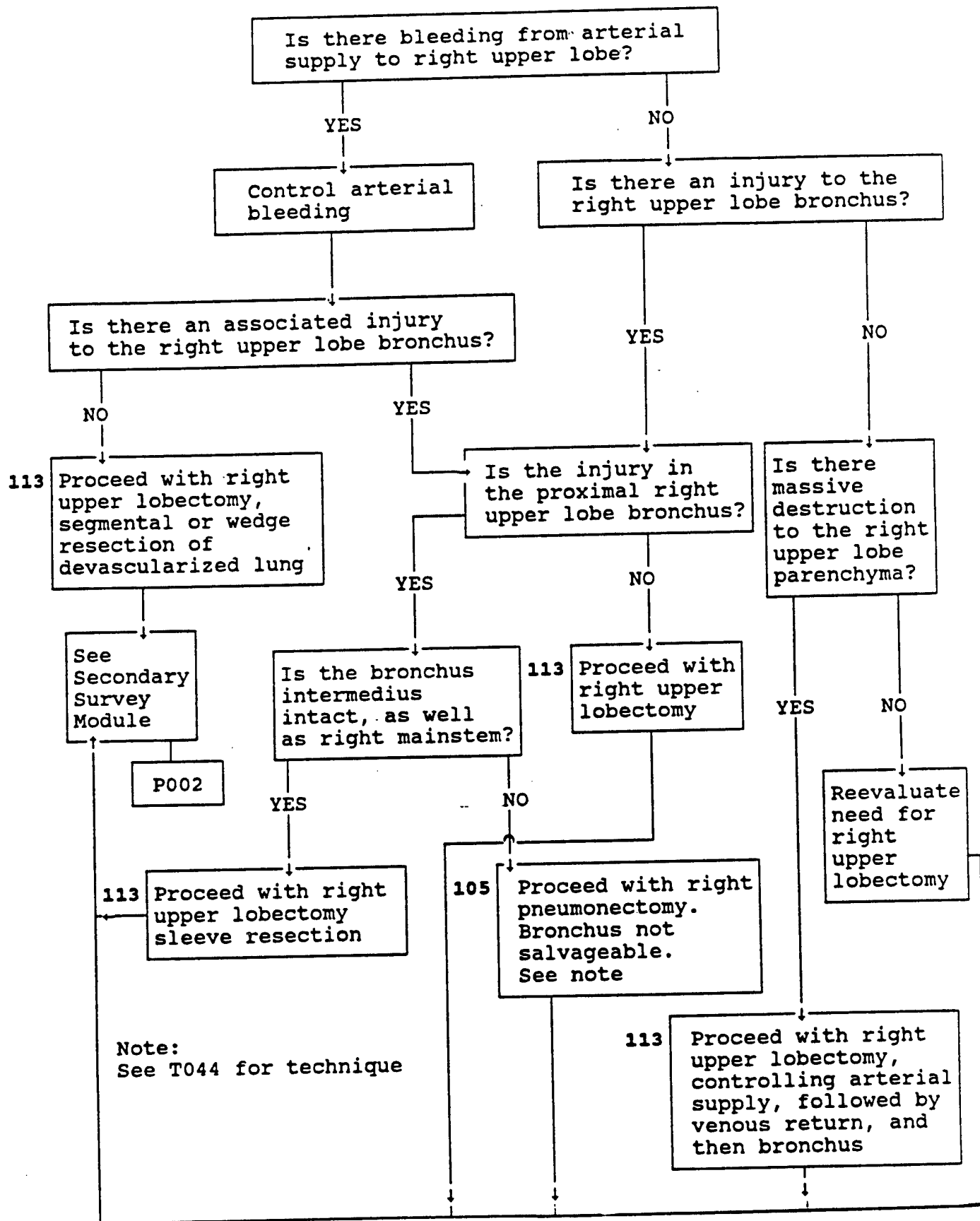


DISTAL RIGHT PULMONARY ARTERY INJURY MODULE

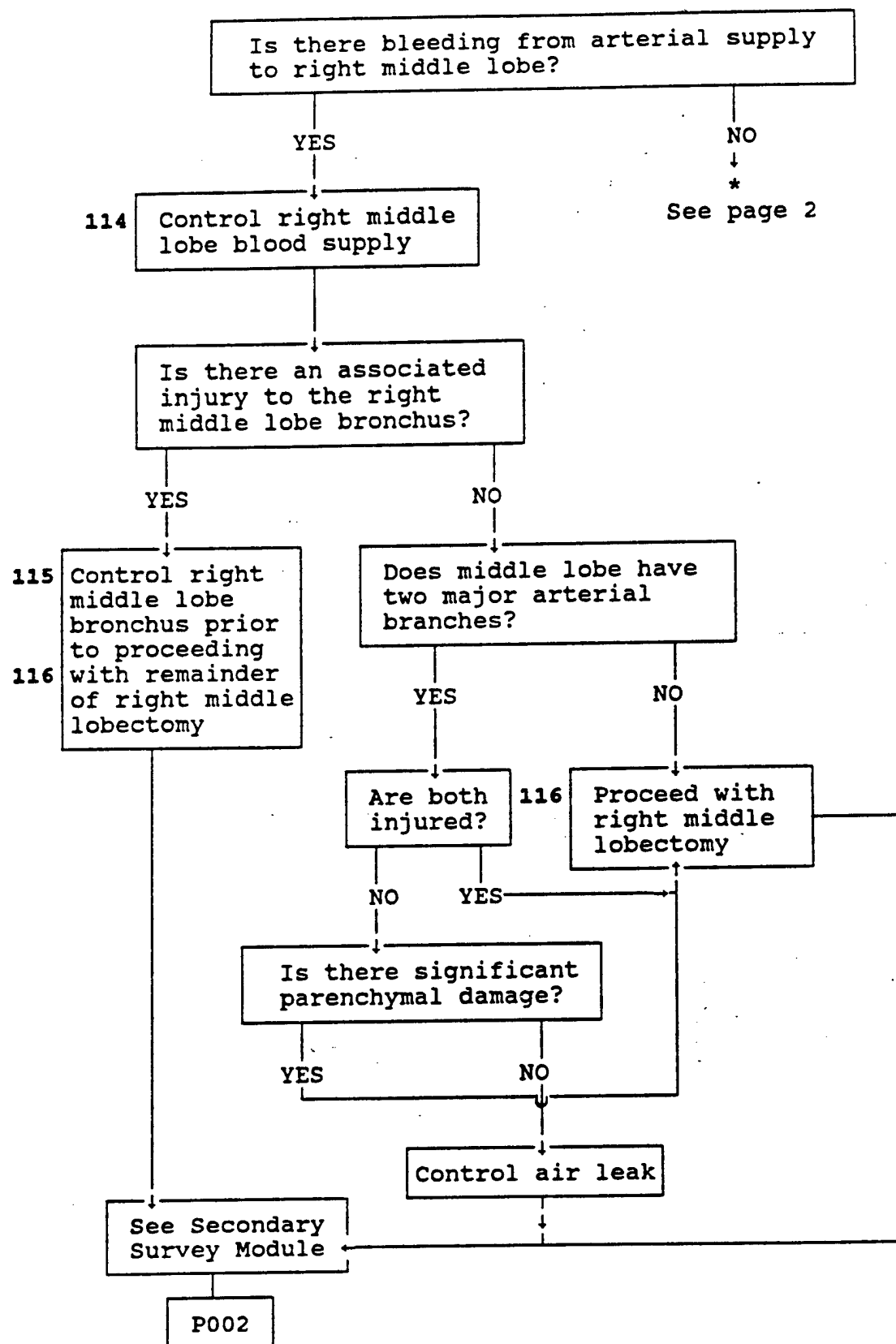


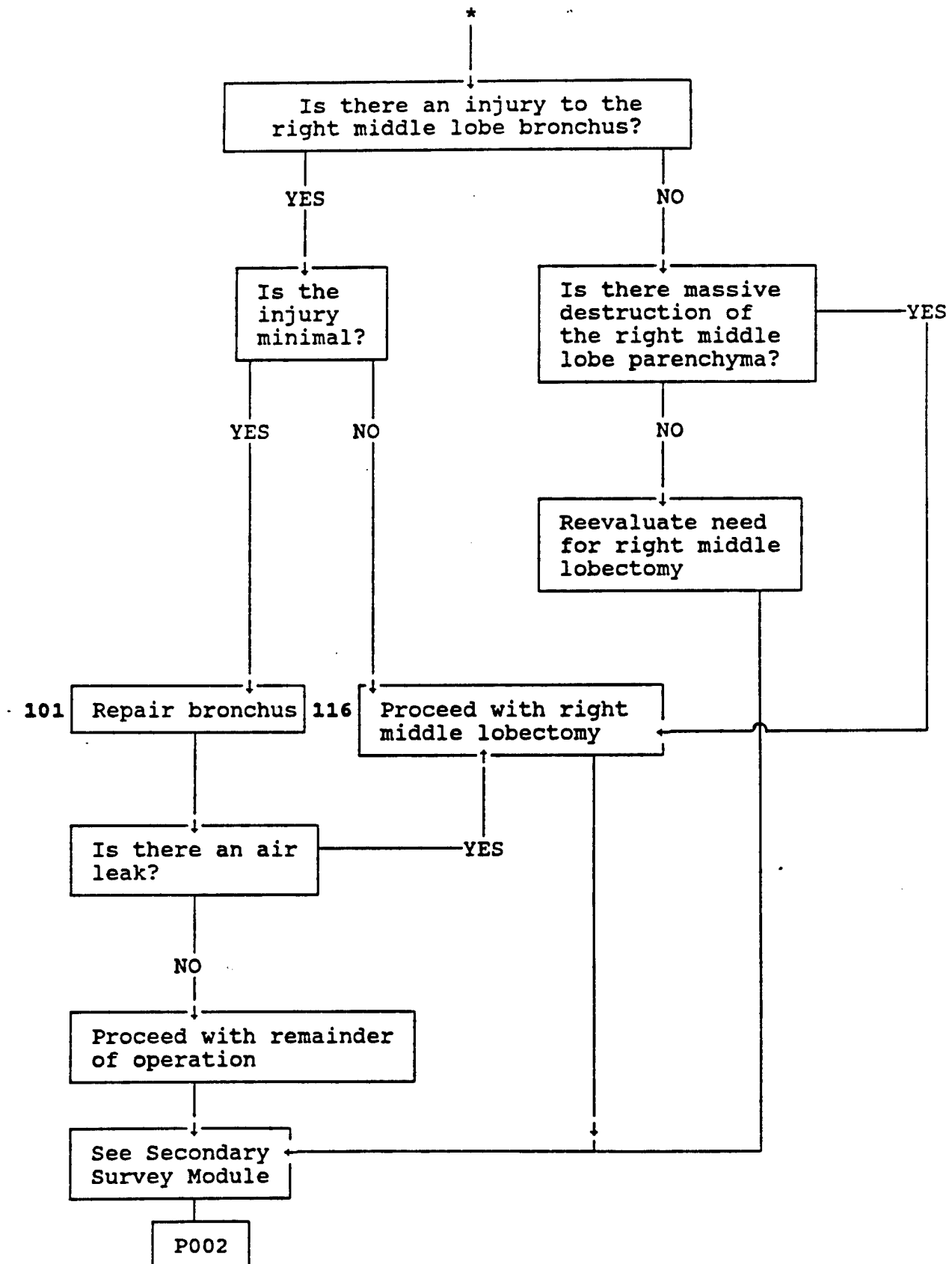


RIGHT UPPER LOBECTOMY MODULE



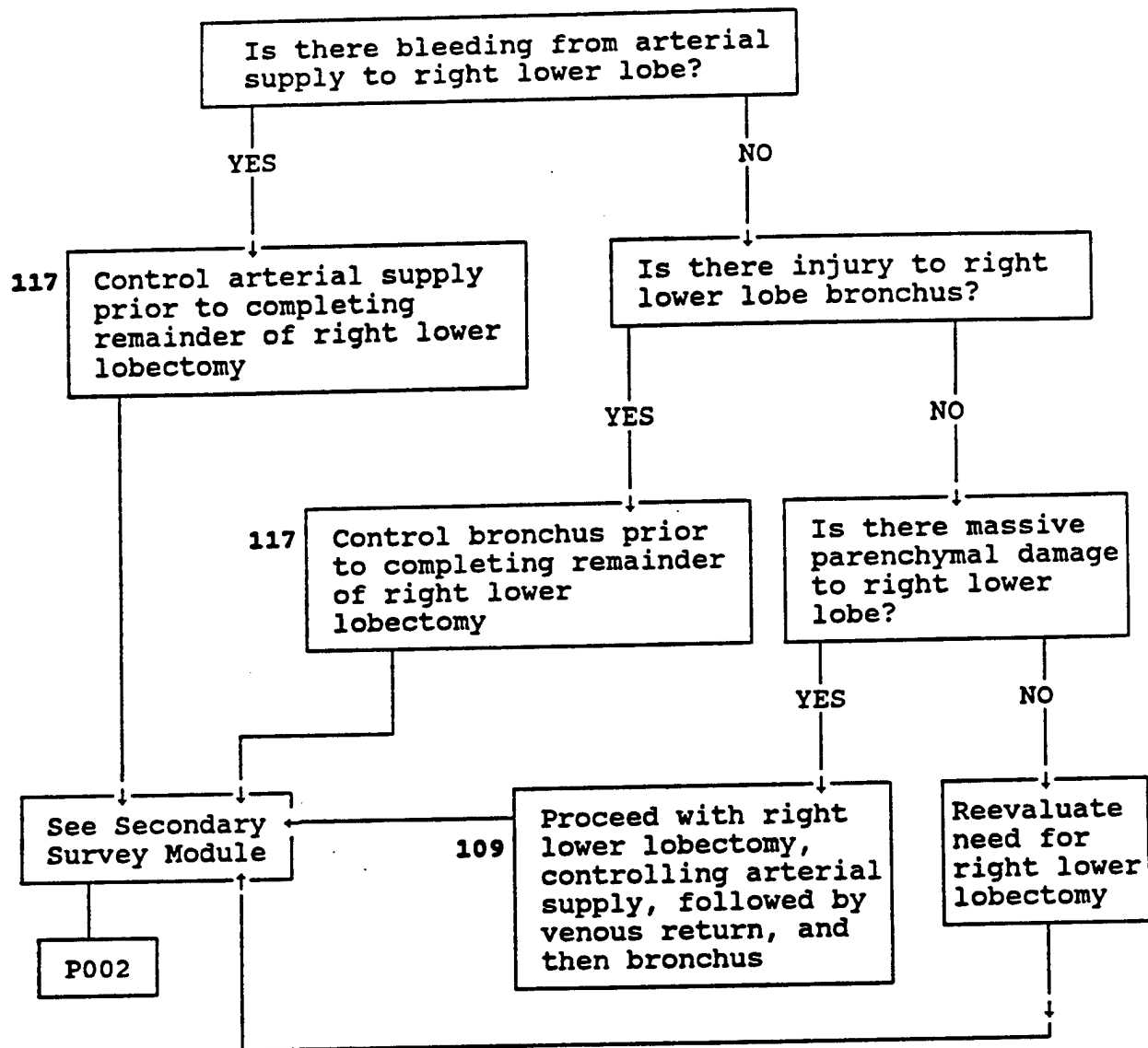
RIGHT MIDDLE LOBECTOMY MODULE



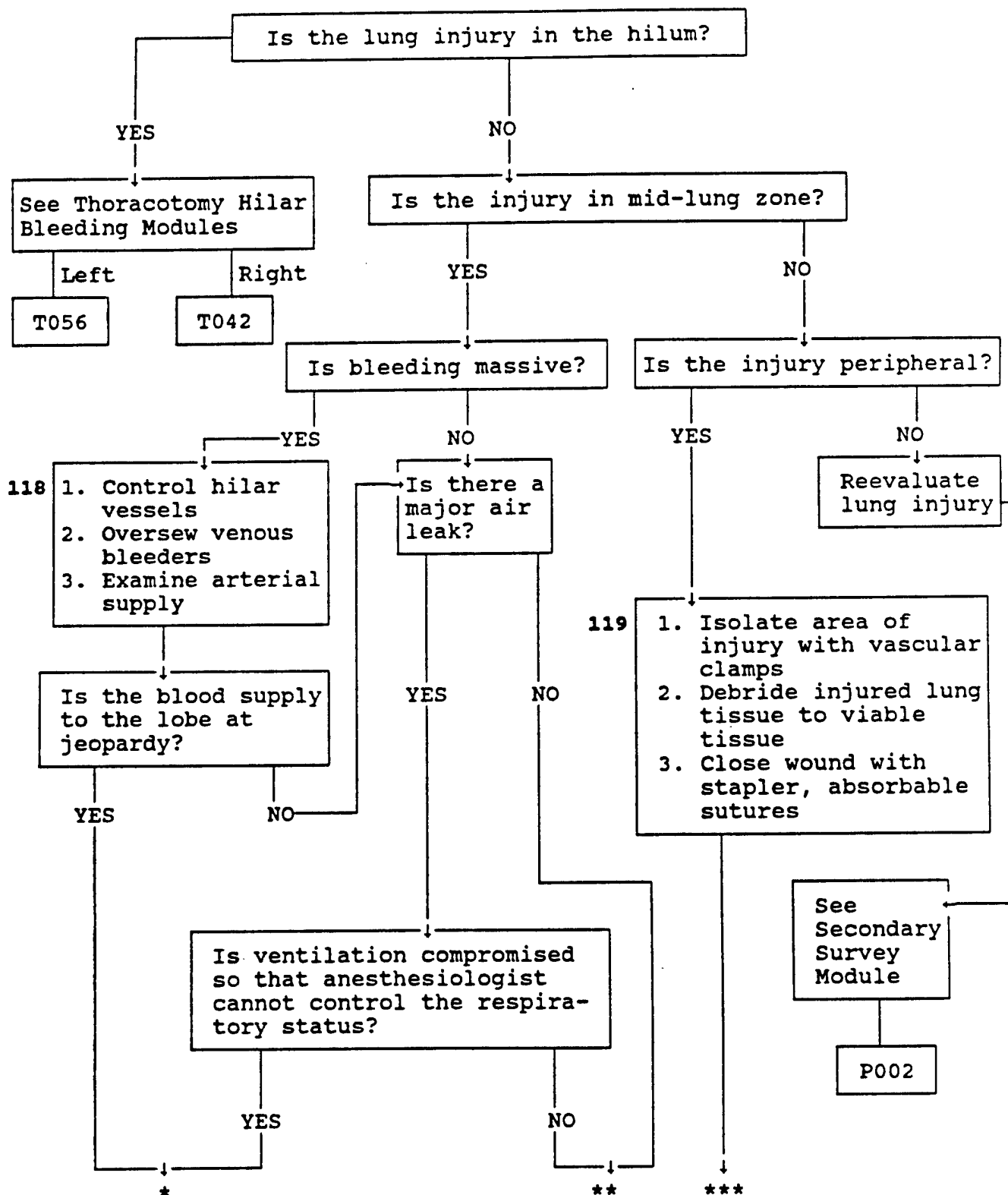




RIGHT LOWER LOBECTOMY MODULE

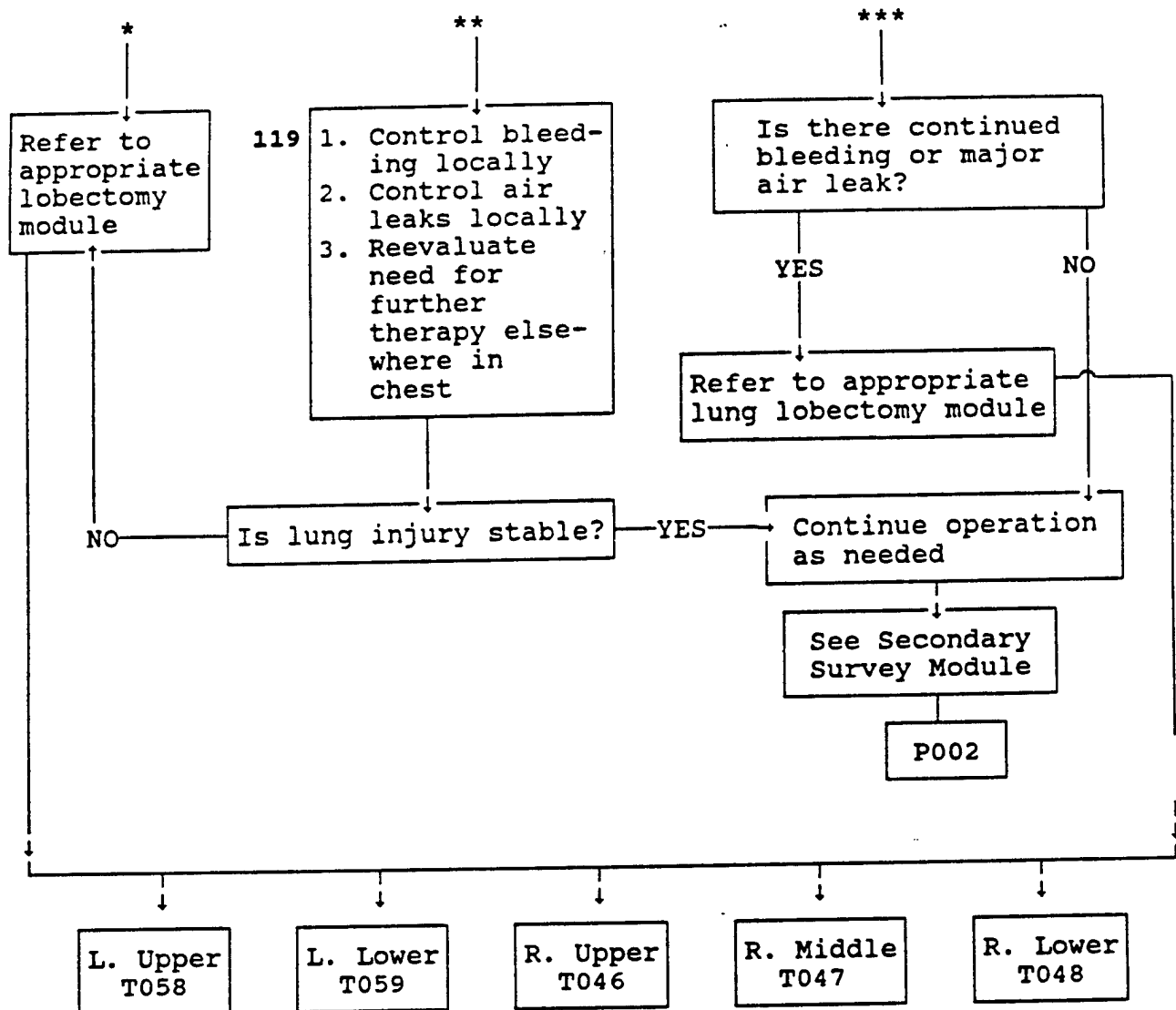


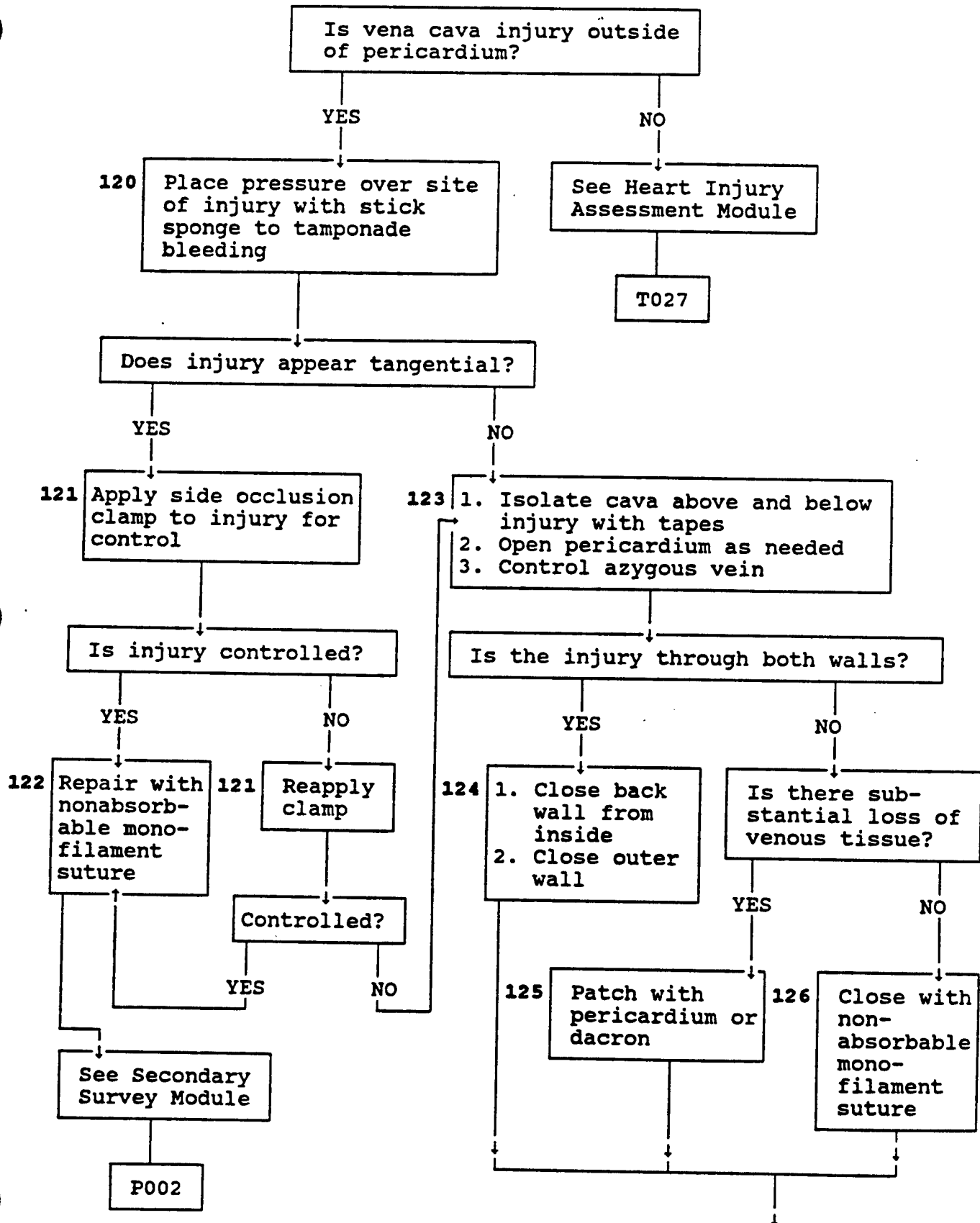
LUNG PARENCHYMAL BLEEDING MODULE

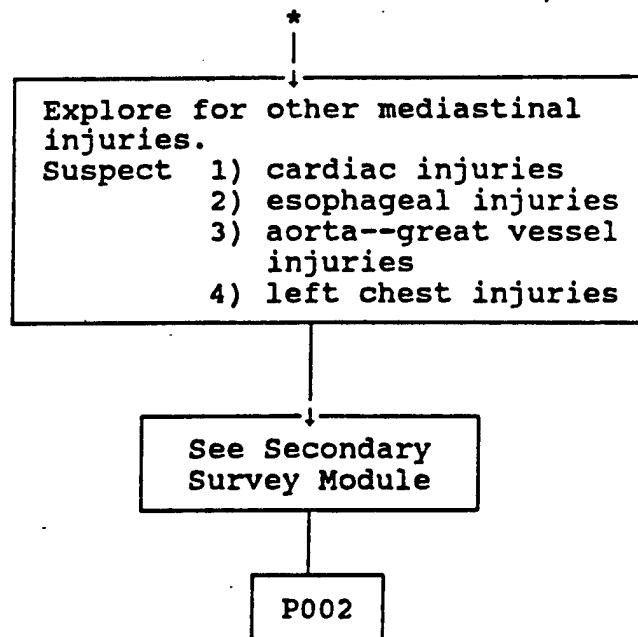


# LUNG PARENCHYMAL BLEEDING MODULE

T049  
2/2







IMMEDIATE LEFT ANTERIOR THORACOTOMY MODULE

- 127
- 1) Make an incision from left parasternal area 4th intercostal space to mid-axillary line.
  - 2) With the cautery setting at 50 watts for coagulation and cutting, extend incision down to superior border of 5th rib and enter pleural space over superior border of left 5th rib. As the left sternal border is approached, cauterize the intercostal muscles between the 4th and 5th costal chondral junctions.
  - 3) Hemoclip the left internal mammary artery and vein in continuity and divide.
  - 4) Insert a chest retractor into 4th intercostal space and open widely for 5-6 inches.

Is there an injury to the pericardium  
or evidence of cardiac tamponade?

Yes

Left Pericardiotomy  
Module

T052

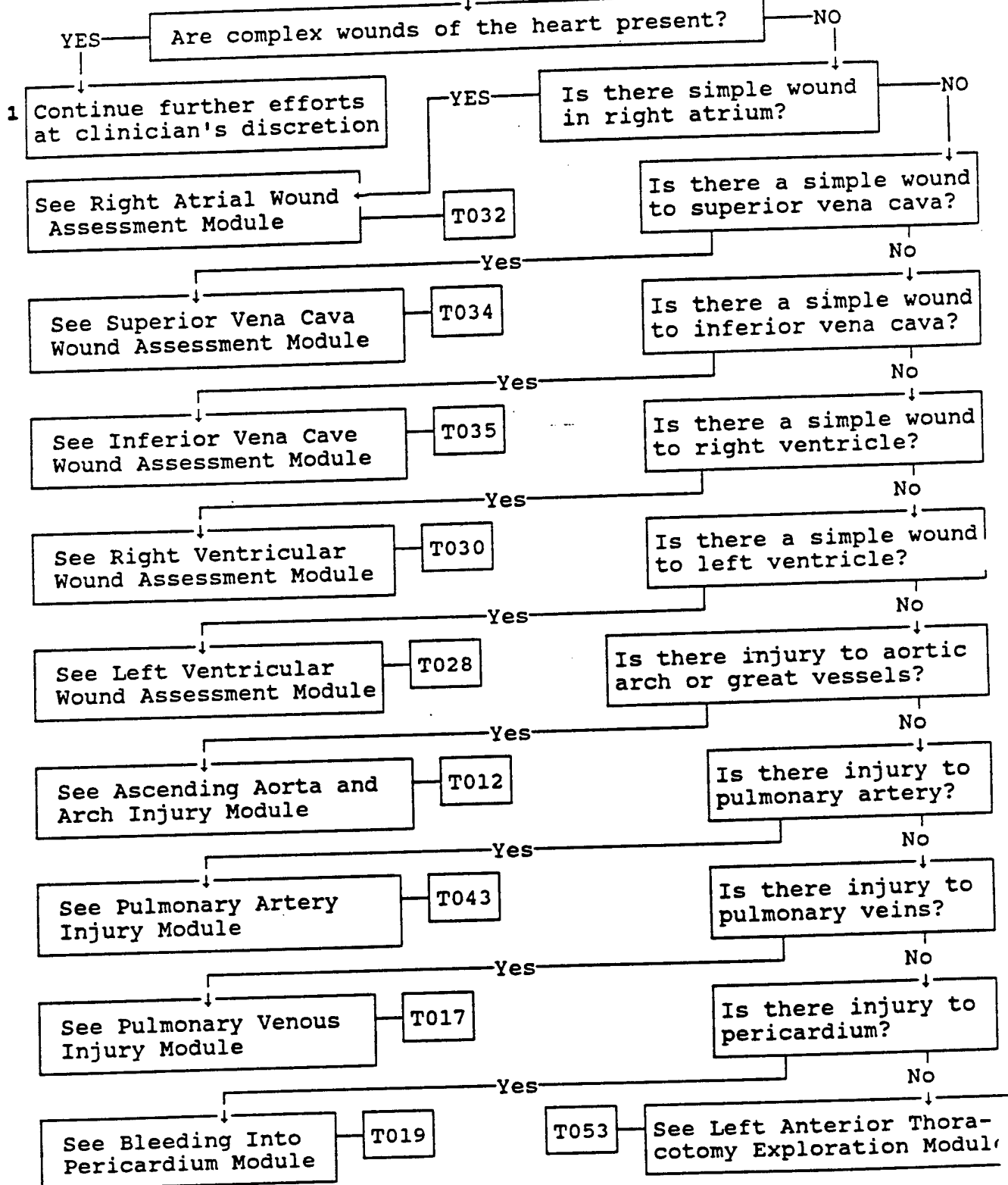
No

Left Anterior Thoracotomy  
Exploration Module

T053

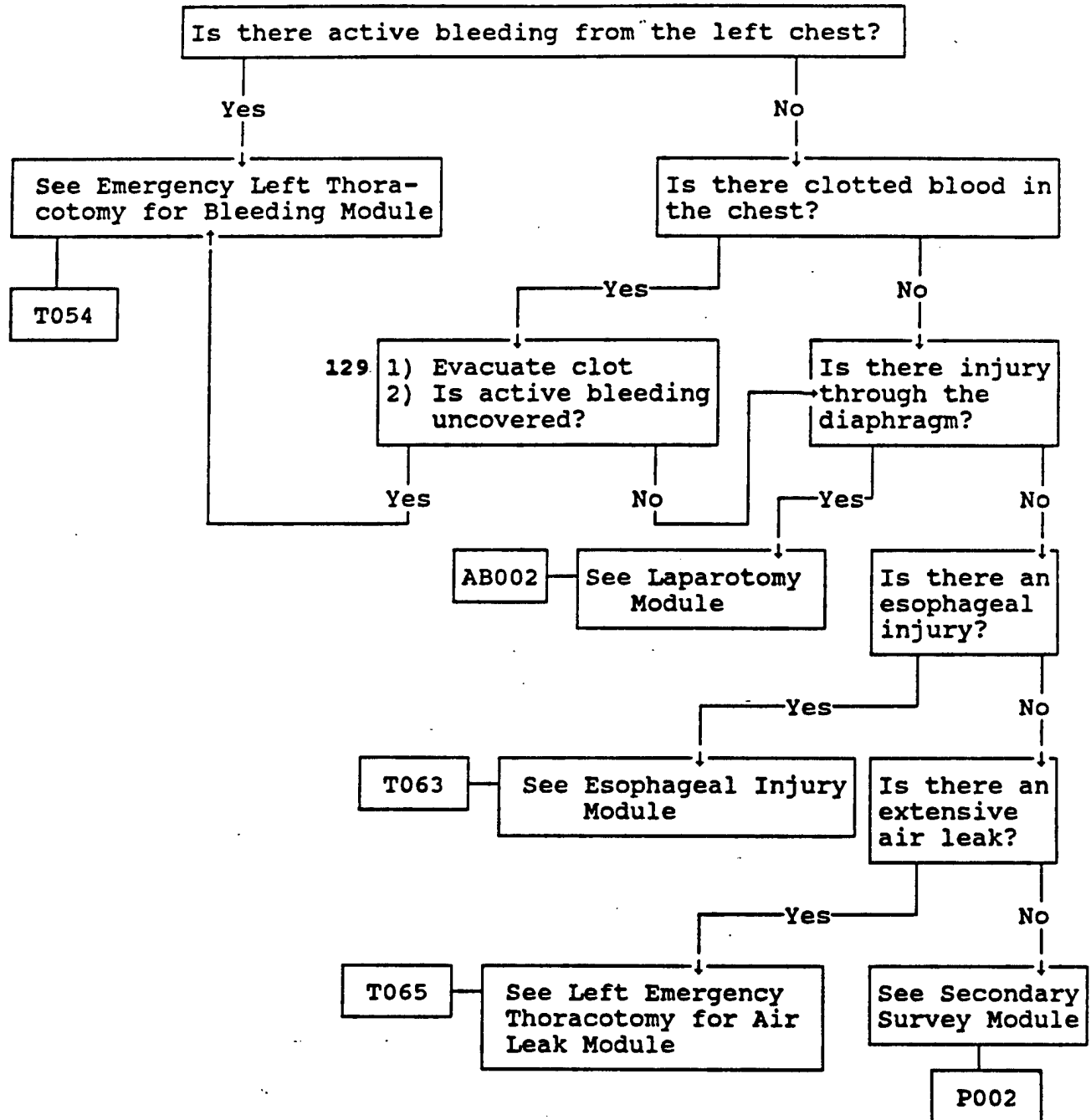
128

- 1) Make an incision parallel and anterior to the left phrenic nerve
- 2) Suspend edge of pericardium with 3/0 silk



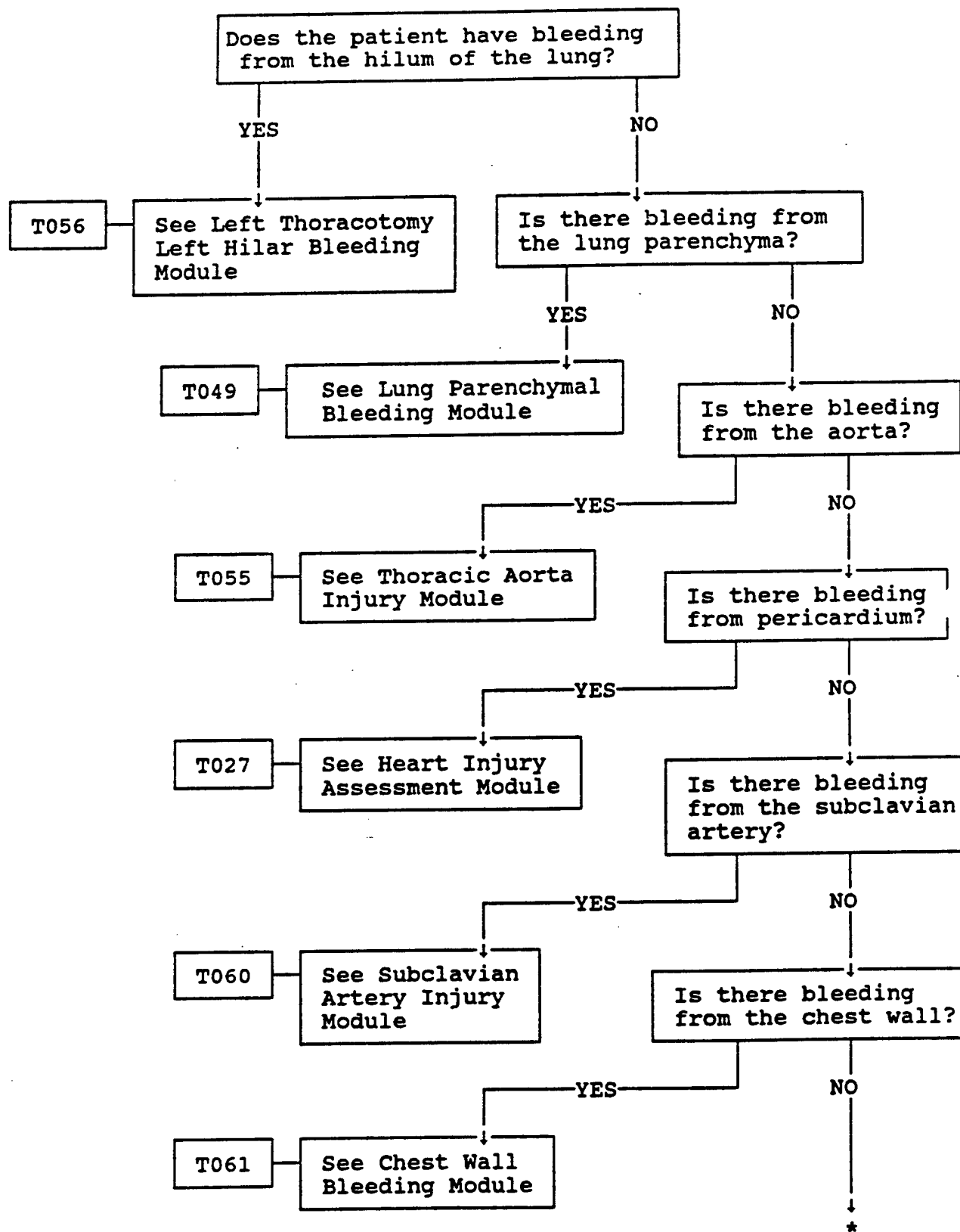
LEFT ANTERIOR THORACOTOMY EXPLORATION MODULE

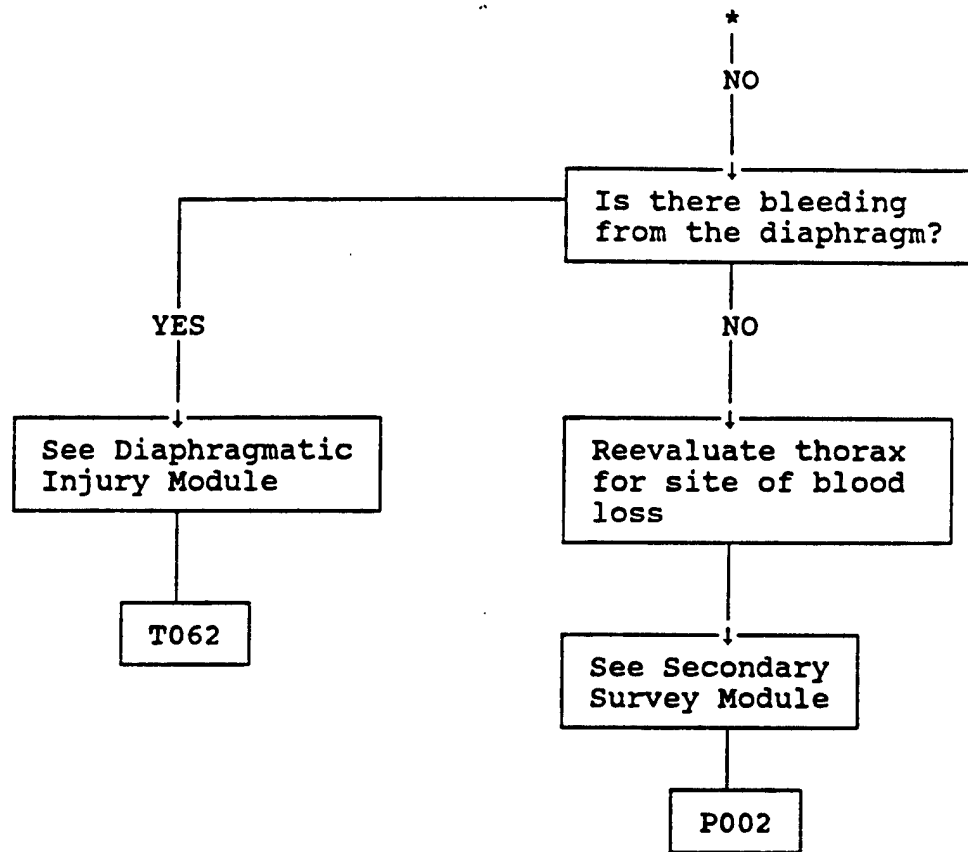
T053  
1/1



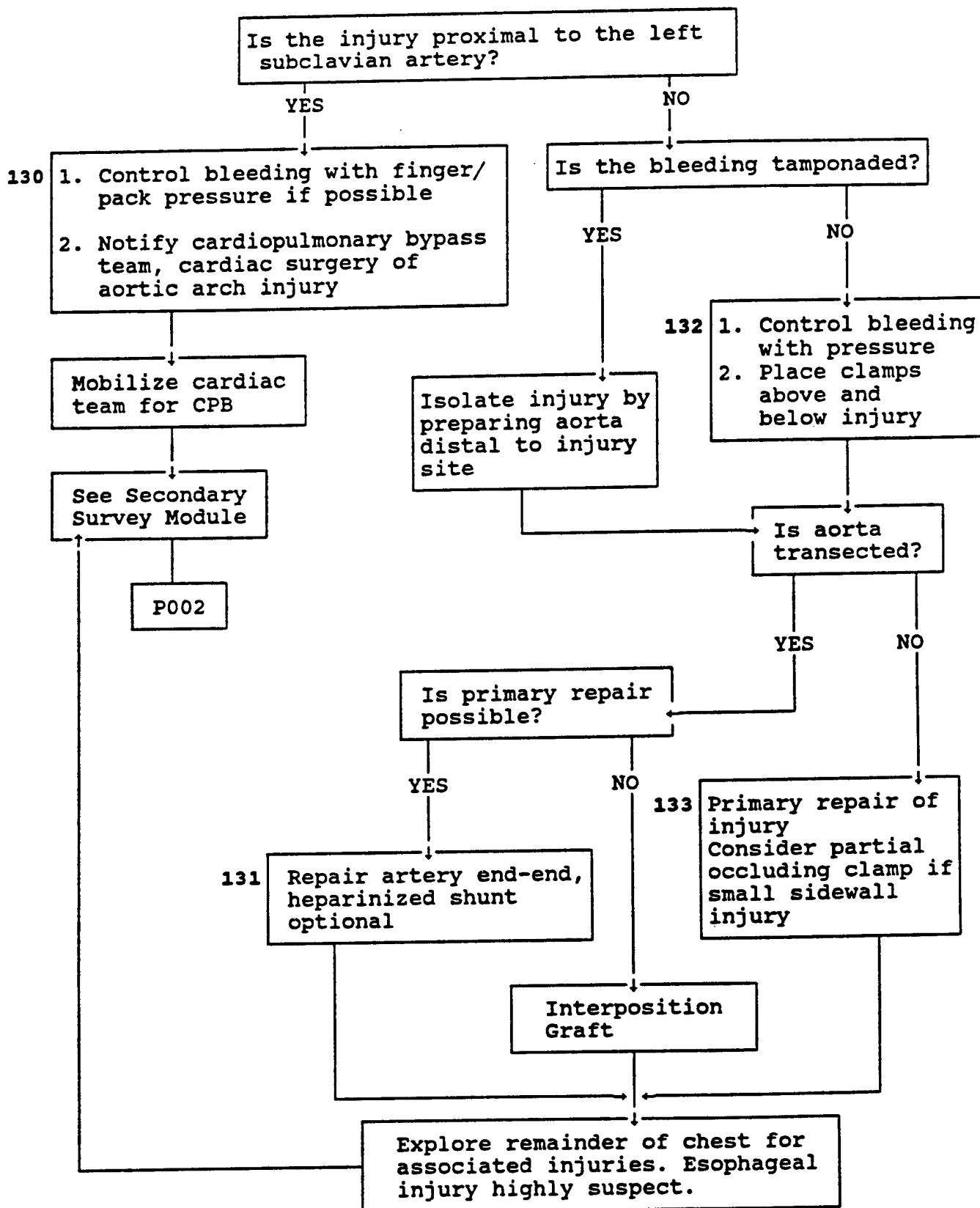


EMERGENCY LEFT THORACOTOMY FOR BLEEDING MODULE

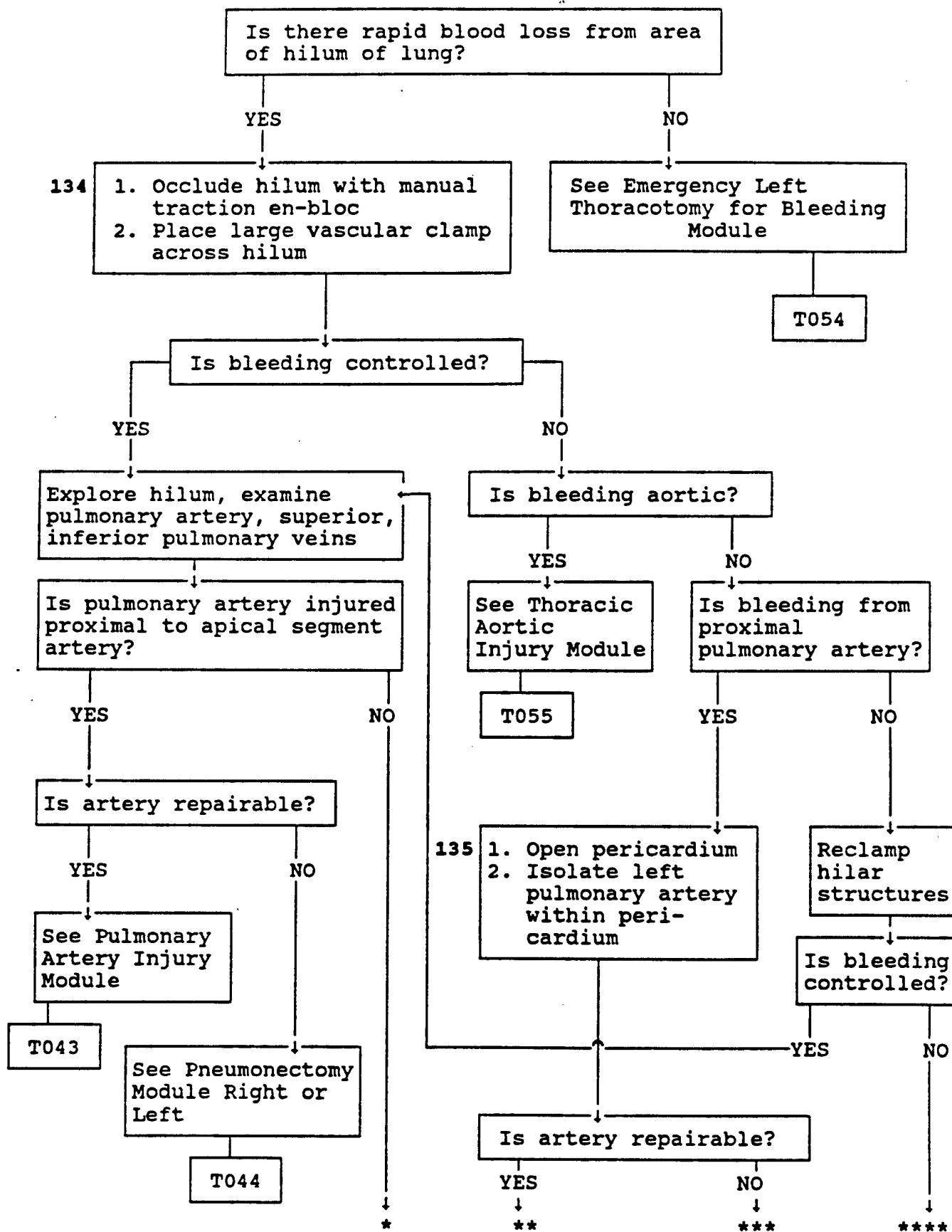




THORACIC AORTIC INJURY MODULE

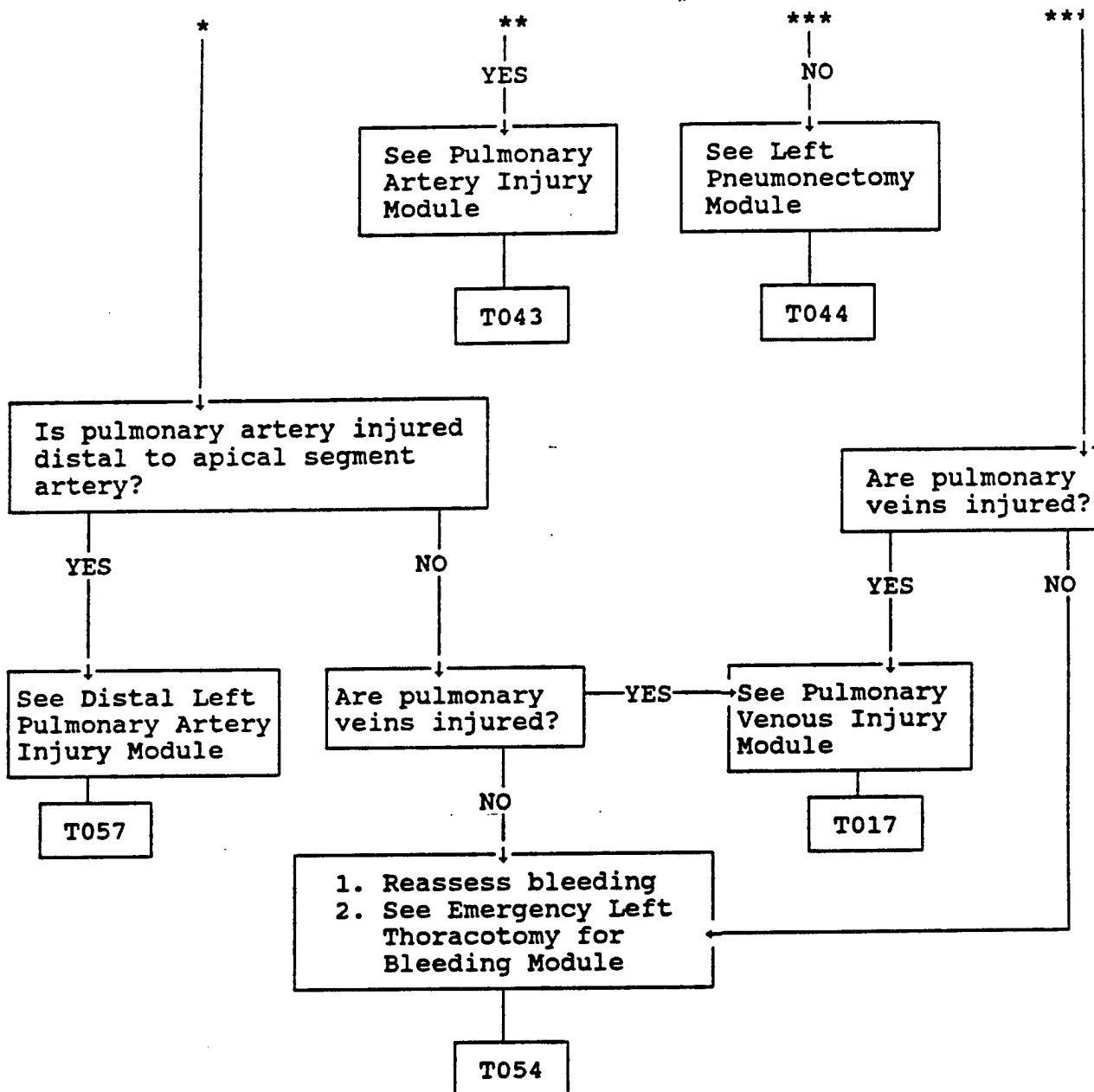


LEFT THORACOTOMY LEFT HILAR BLEEDING MODULE

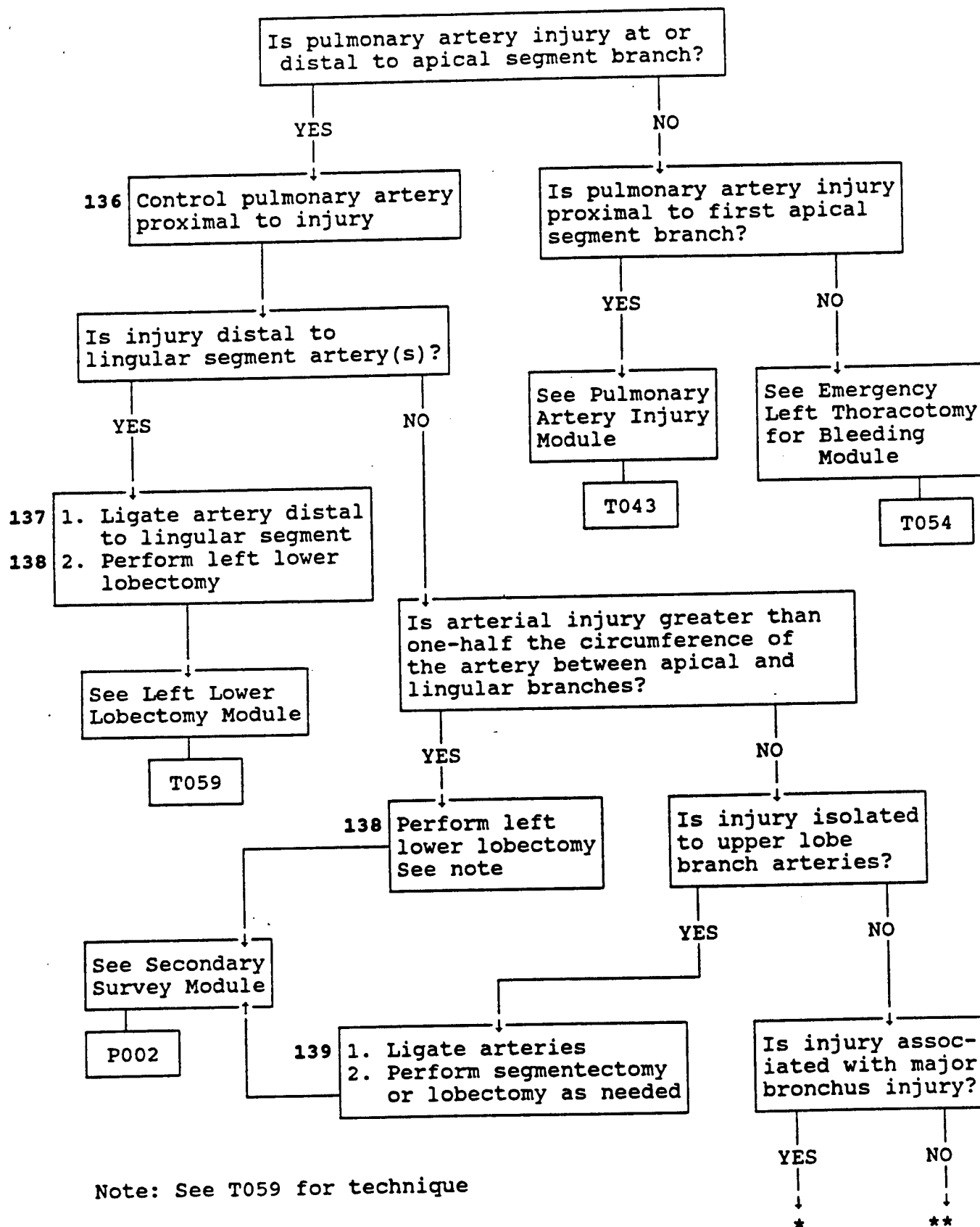


# LEFT THORACOTOMY LEFT HILAR BLEEDING MODULE

T056  
2/2

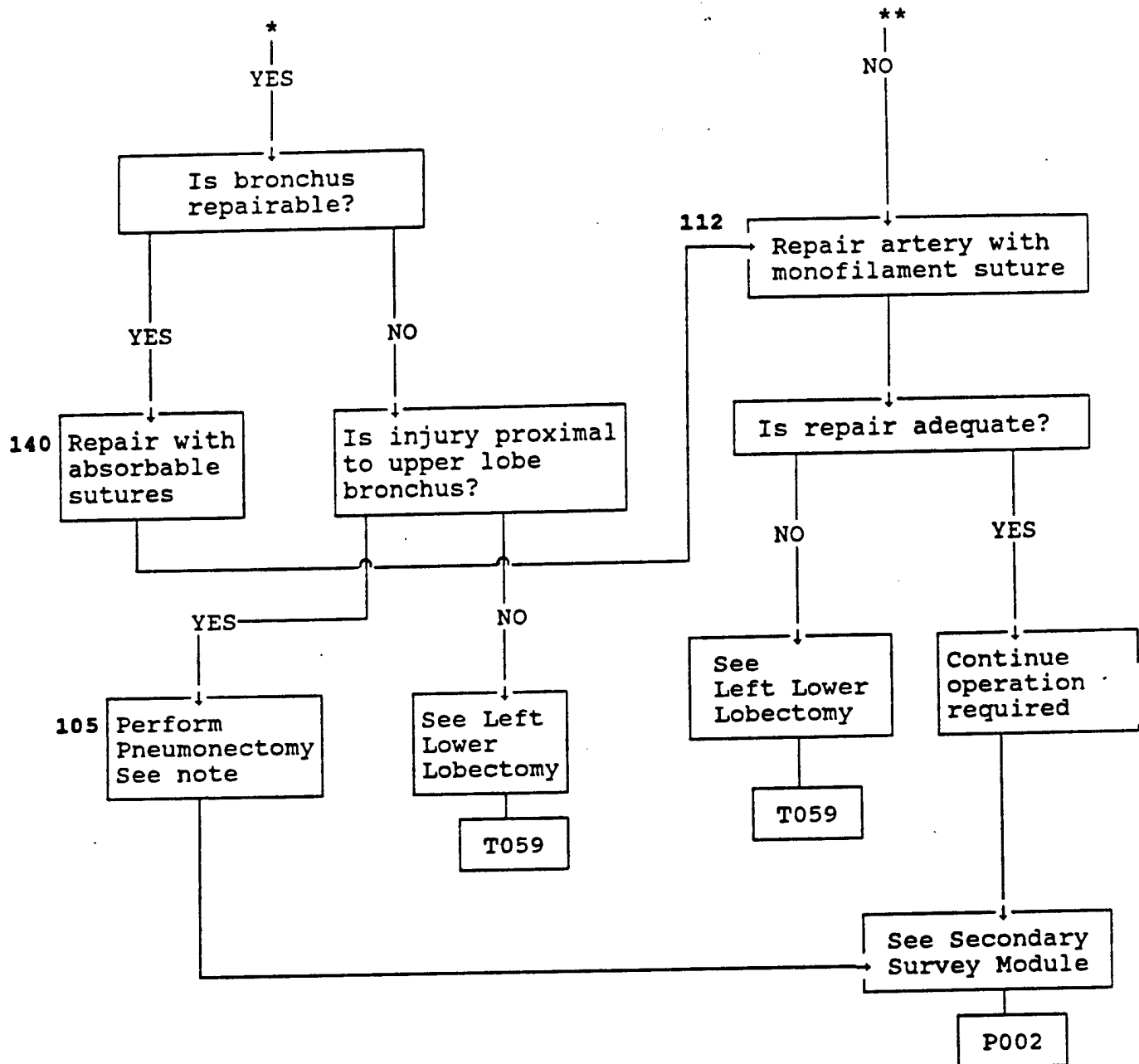


DISTAL LEFT PULMONARY ARTERY INJURY MODULE



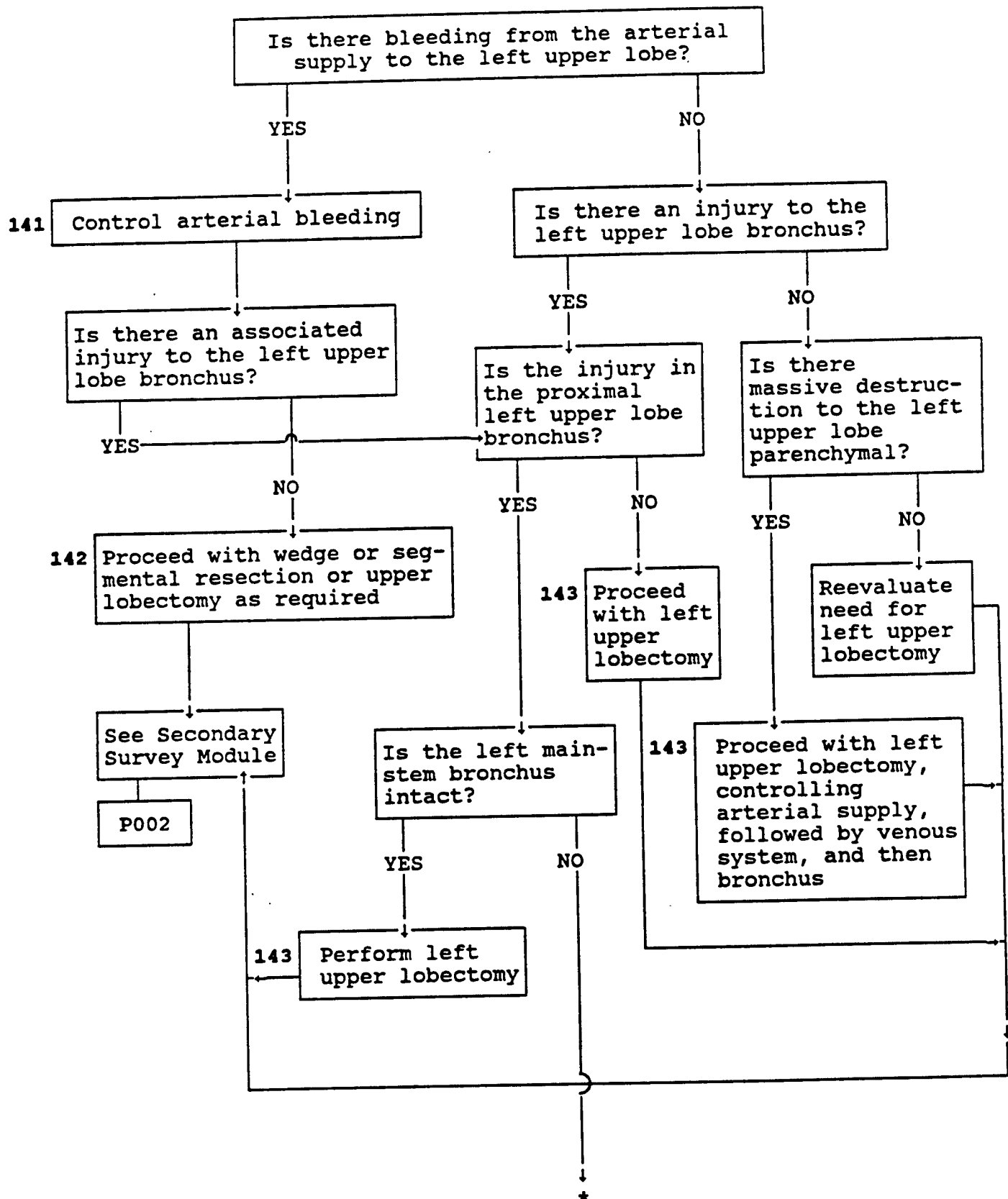
# DISTAL LEFT PULMONARY ARTERY INJURY MODULE

T057  
2/2



Note: See T044 for technique

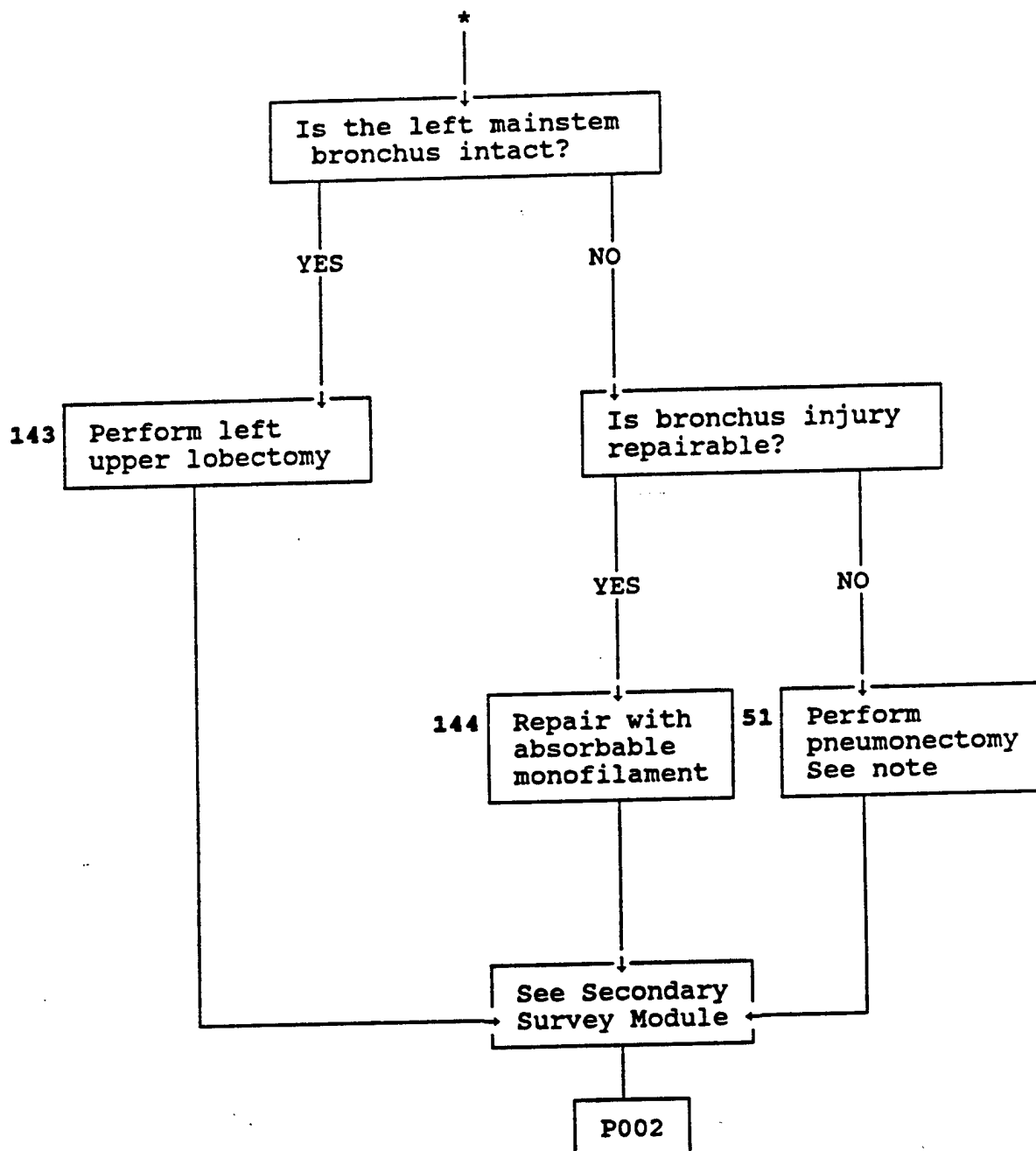
LEFT UPPER LOBECTOMY MODULE





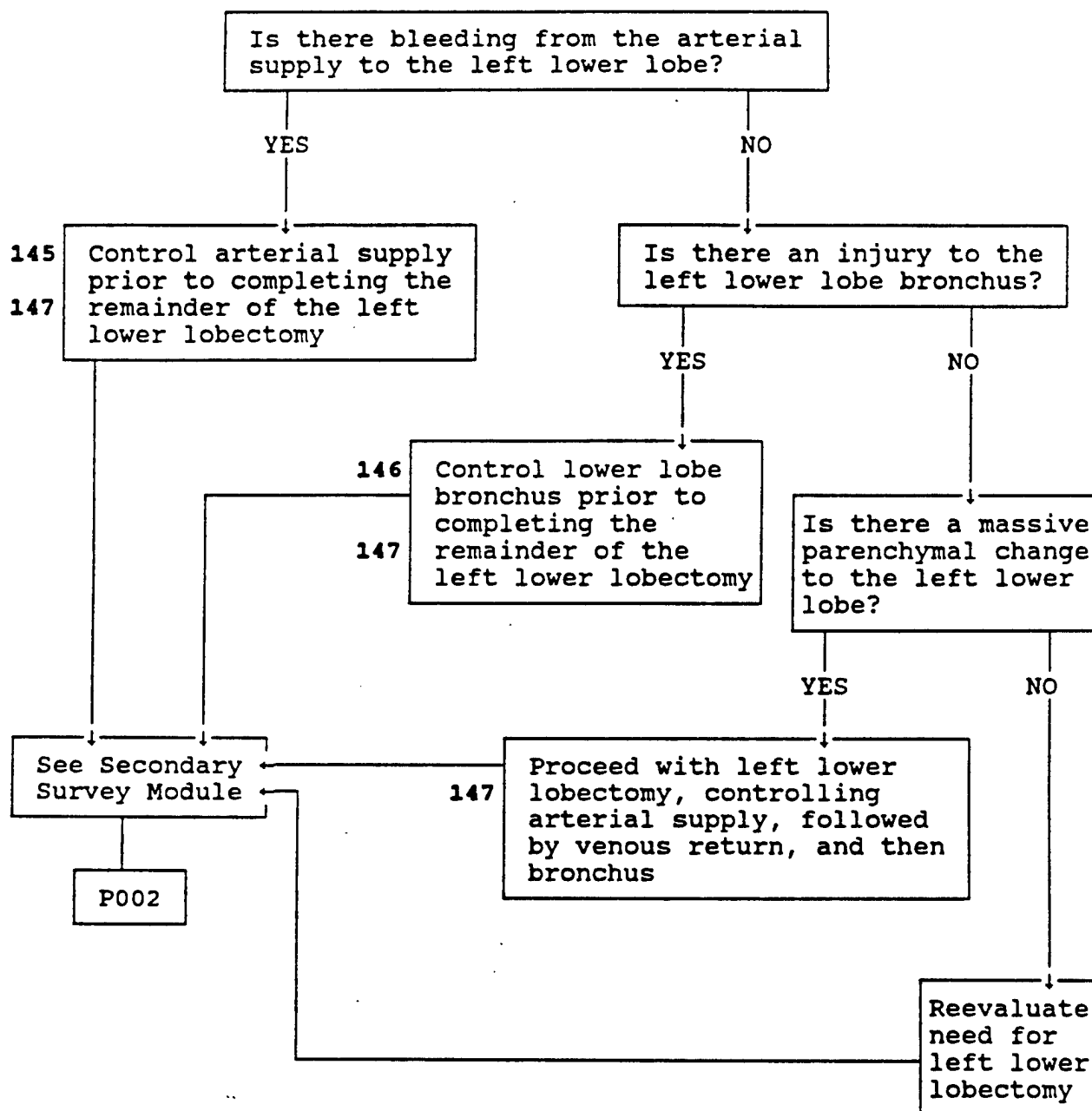
# LEFT UPPER LOBECTOMY MODULE

T058  
2/2

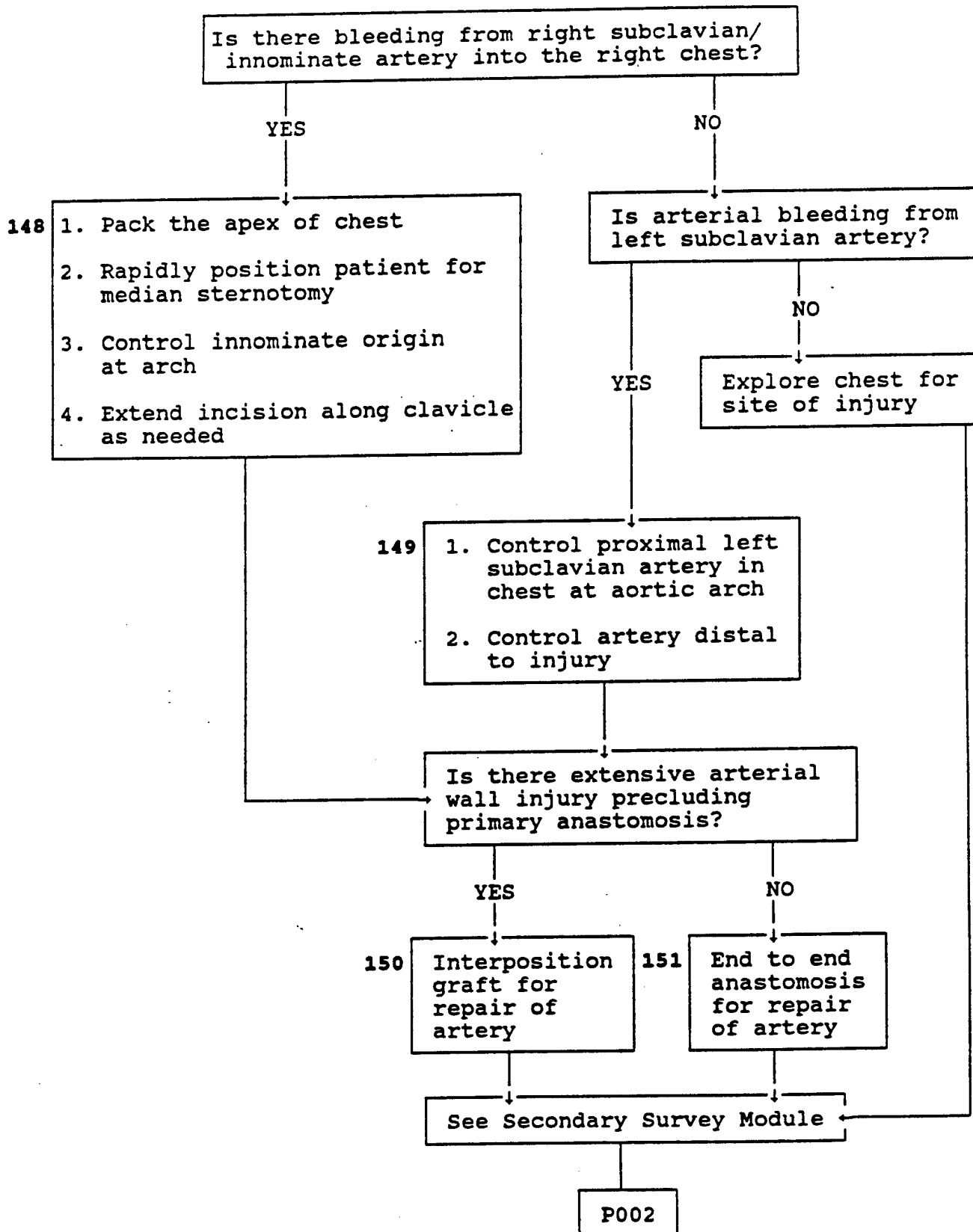


Note: See T044 for technique

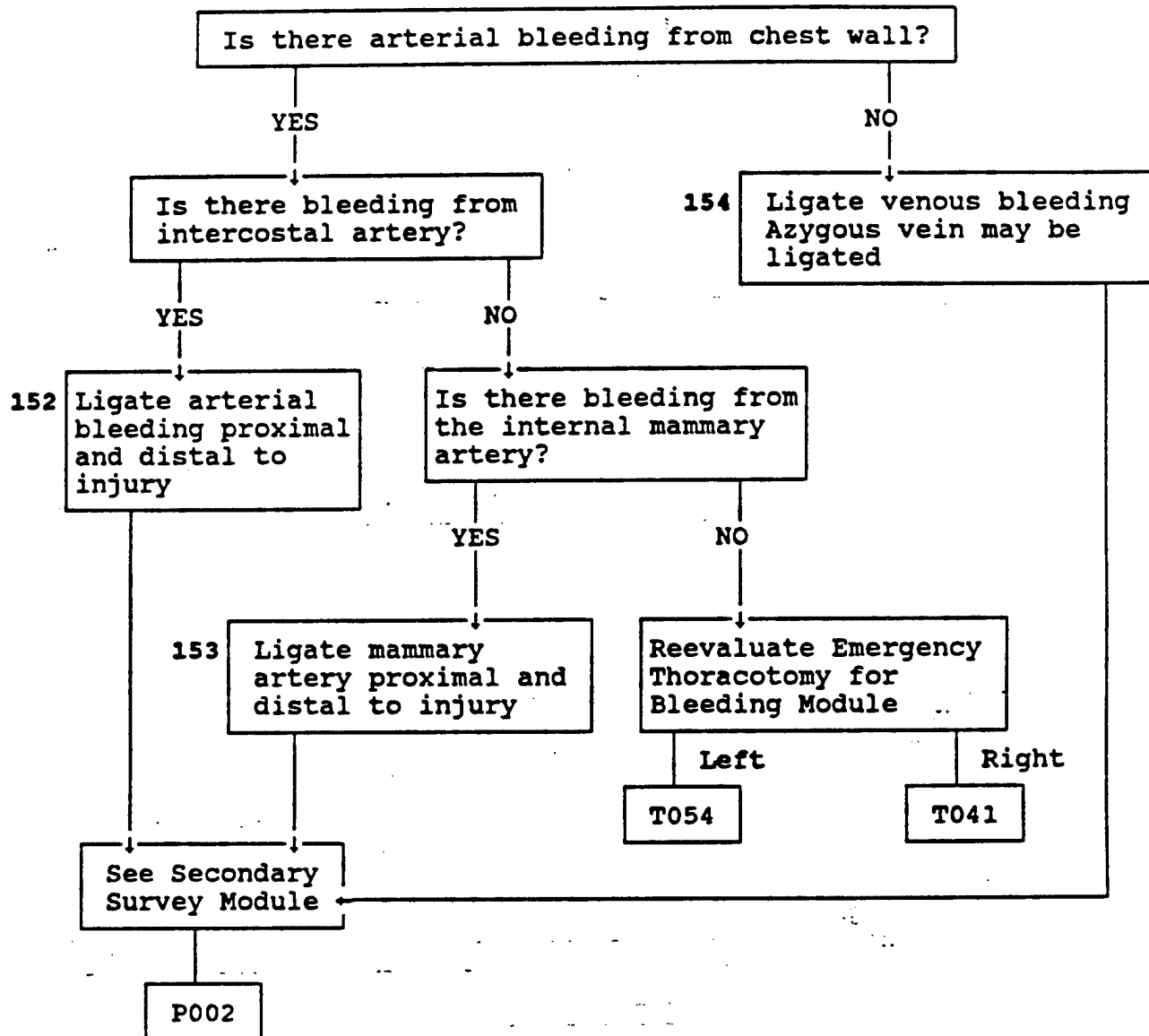
LEFT LOWER LOBECTOMY MODULE



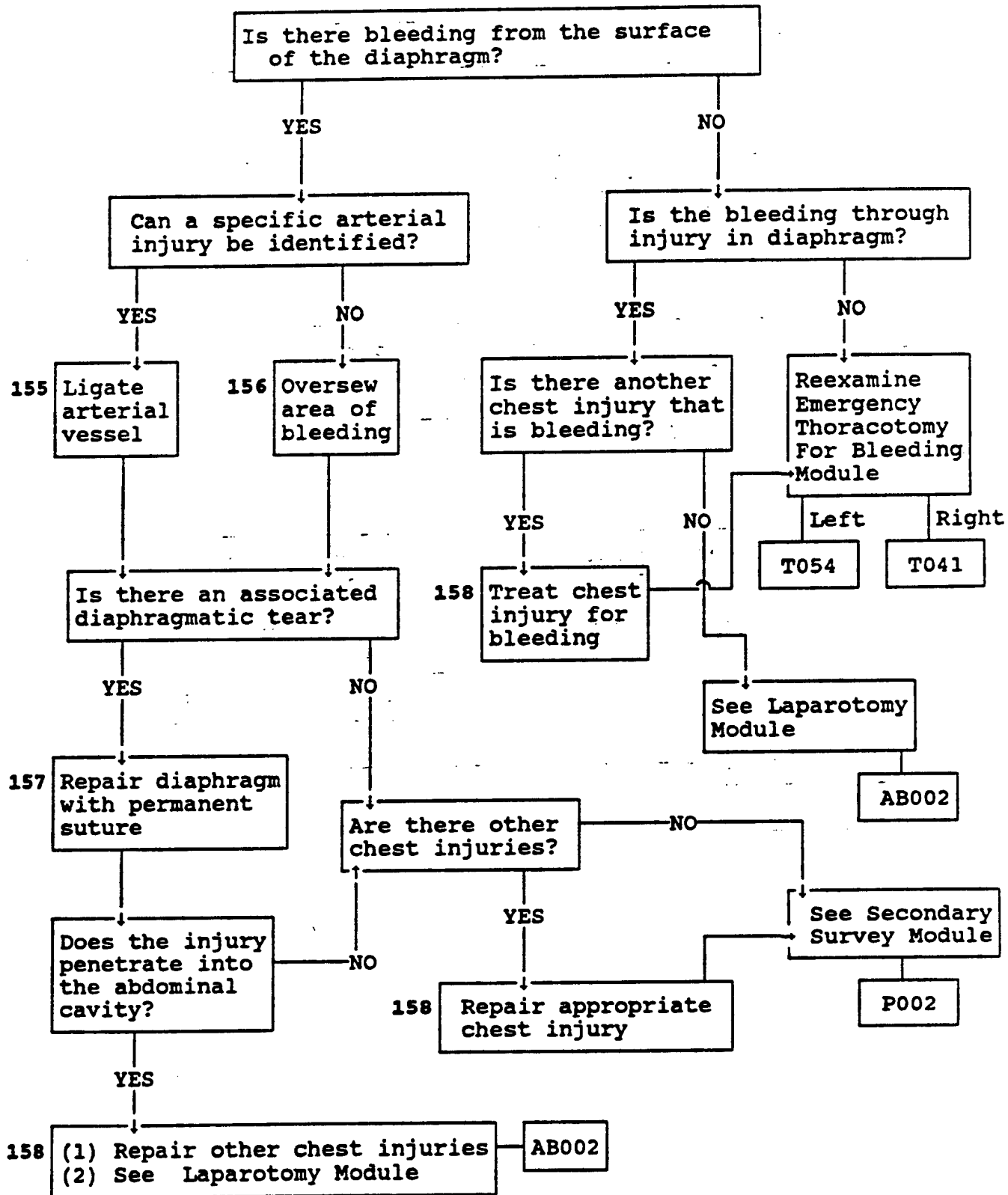
SUBCLAVIAN ARTERY INJURY MODULE



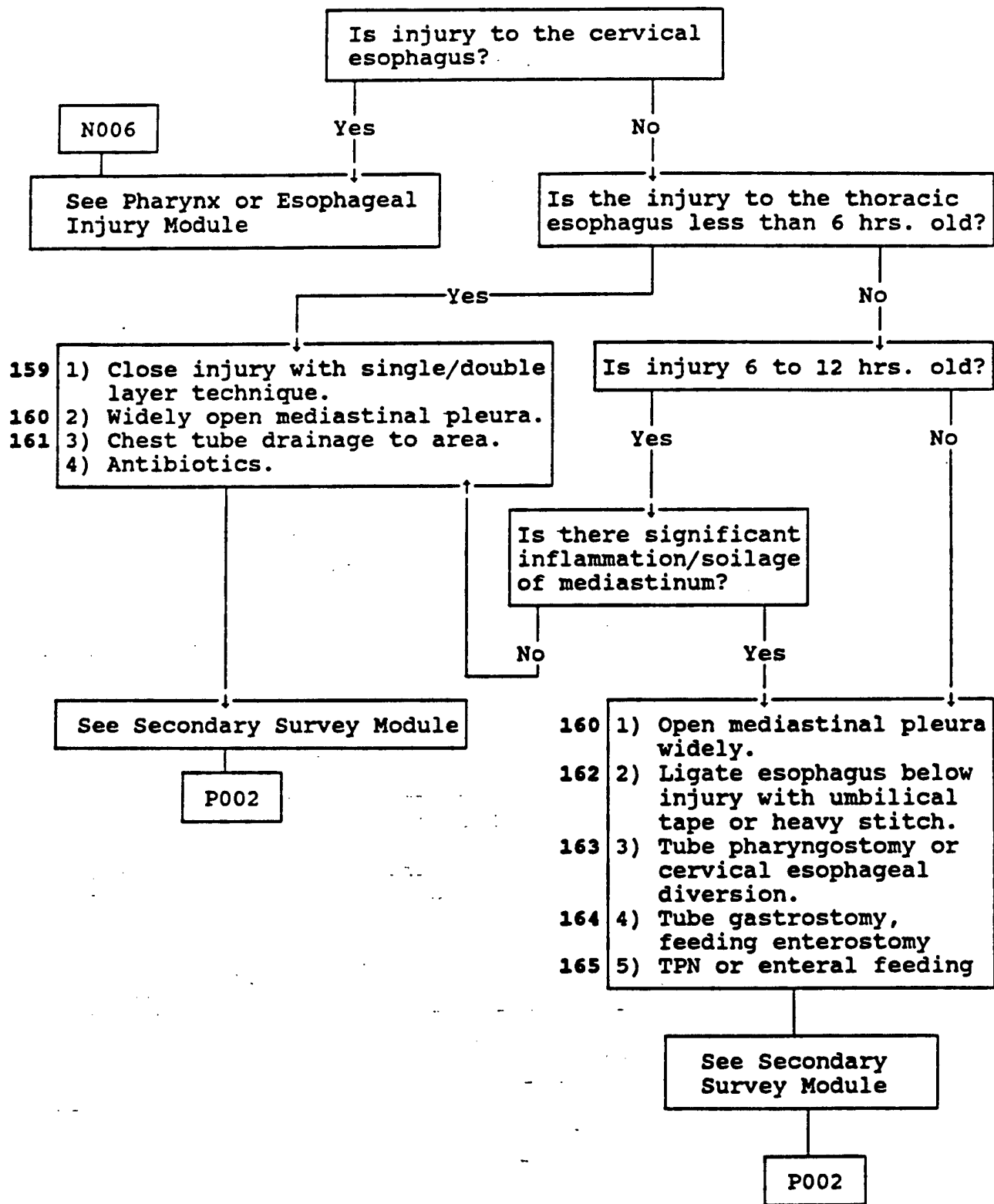
CHEST WALL BLEEDING MODULE



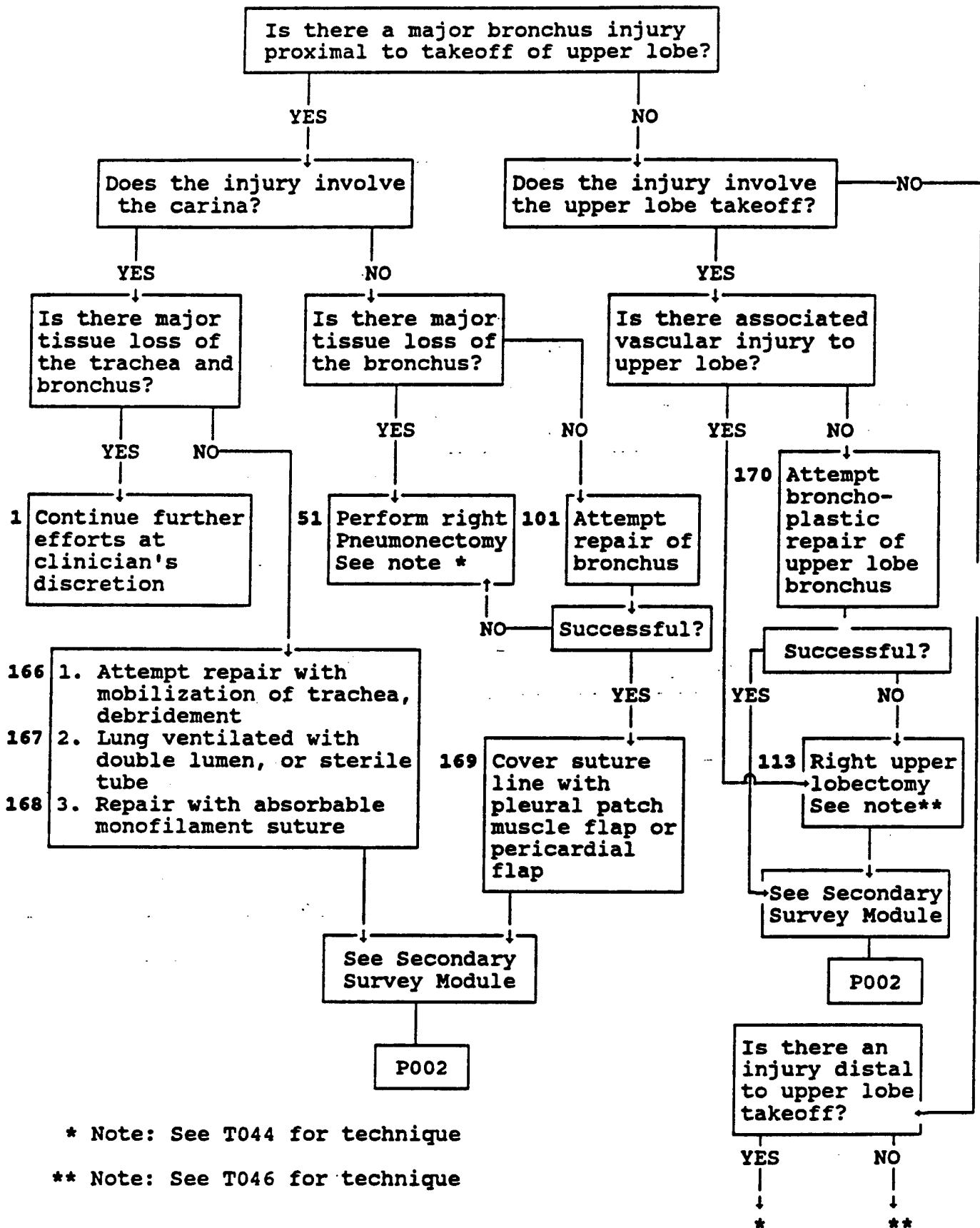
DIAPHRAGMATIC INJURY MODULE



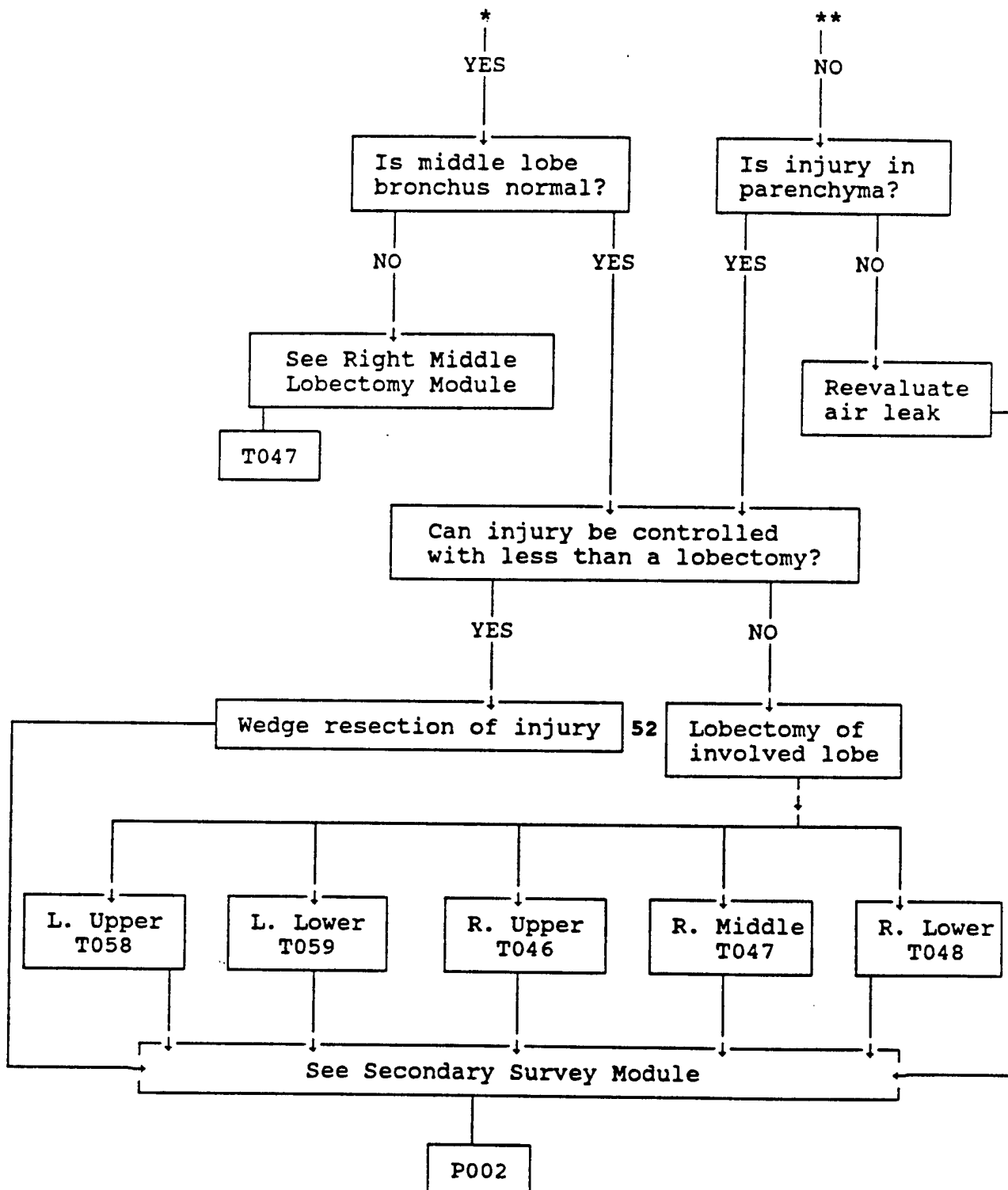
ESOPHAGEAL INJURY MODULE



RIGHT EMERGENCY THORACOTOMY FOR AIR LEAK

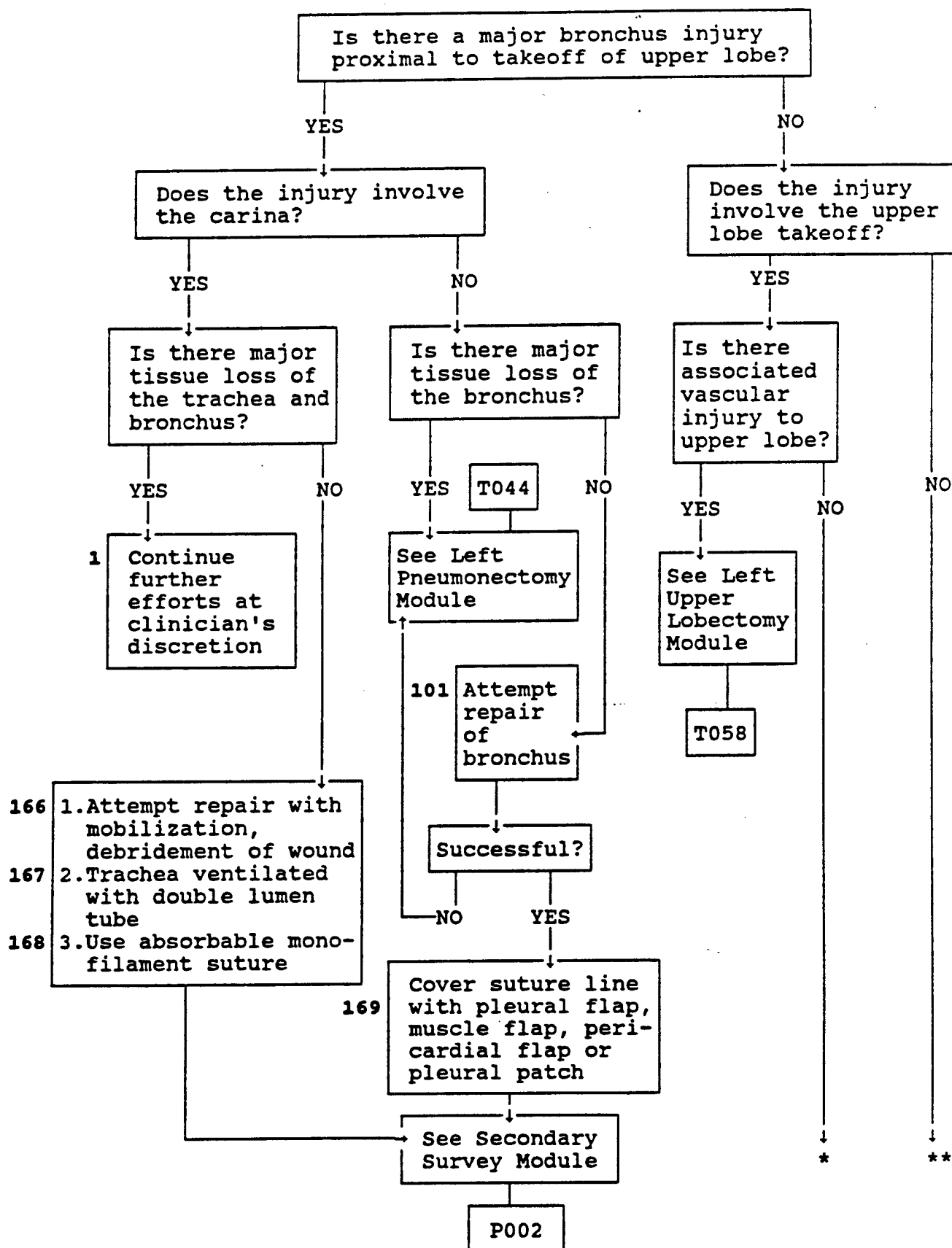


RIGHT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE



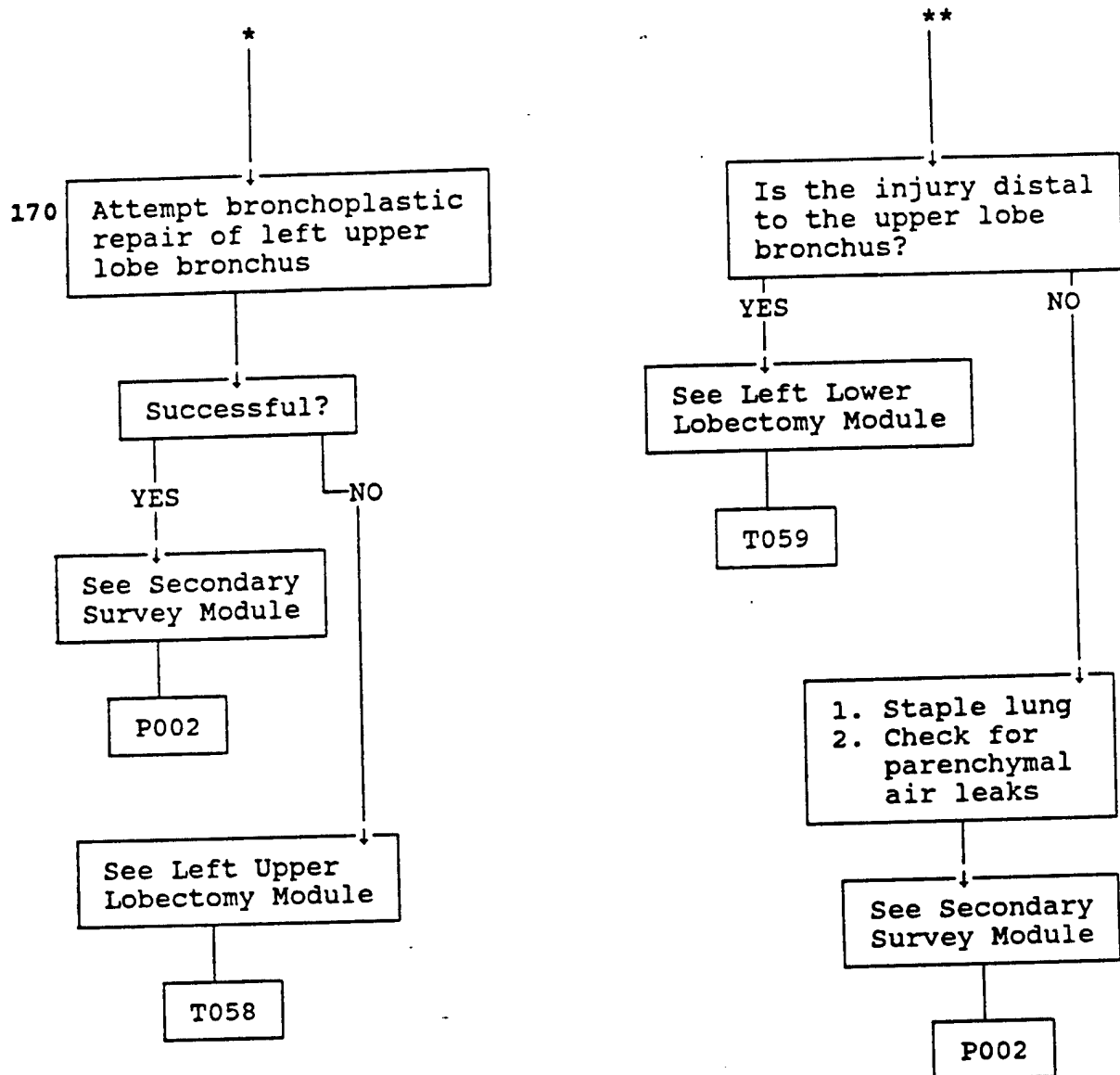


LEFT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE

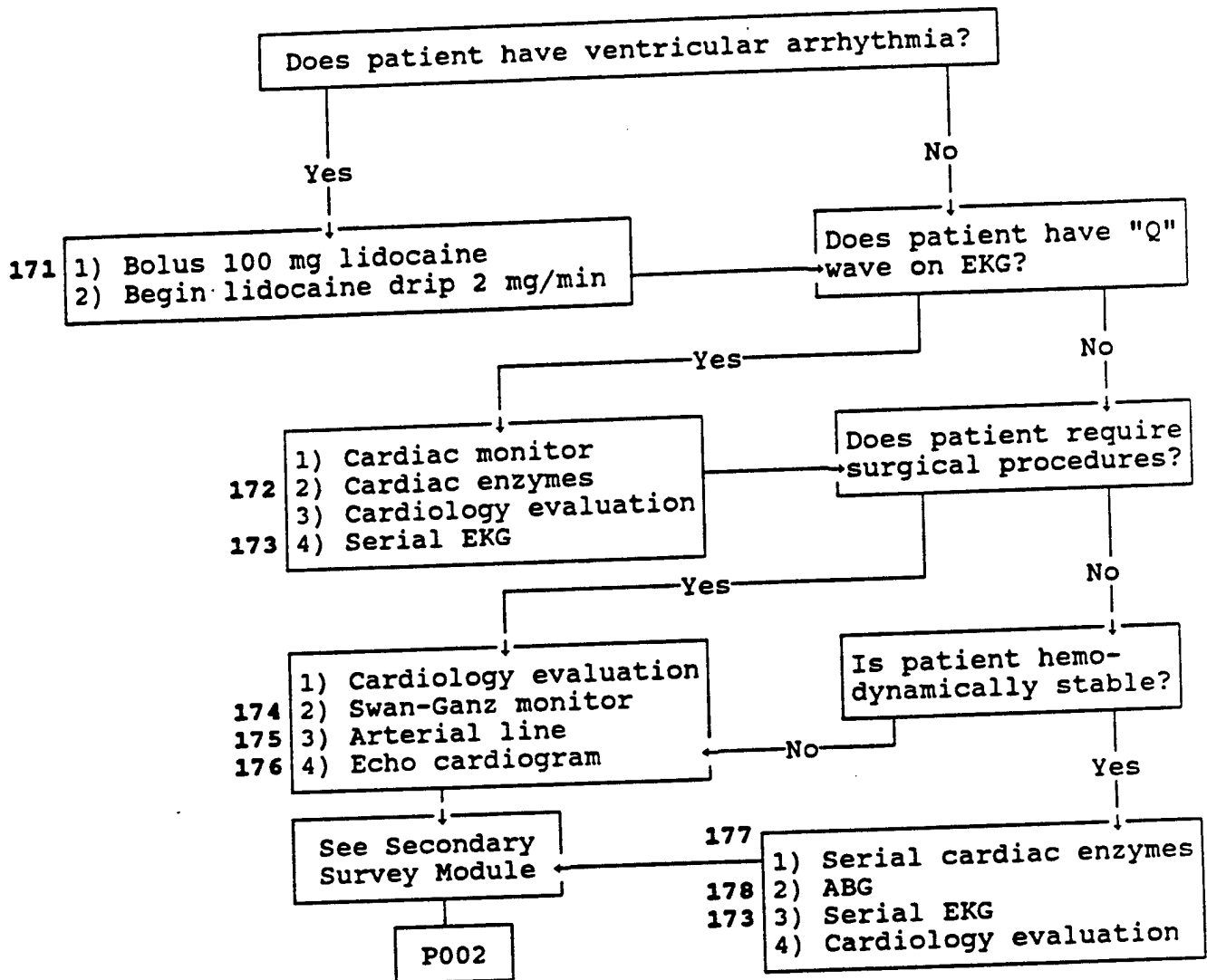


LEFT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE

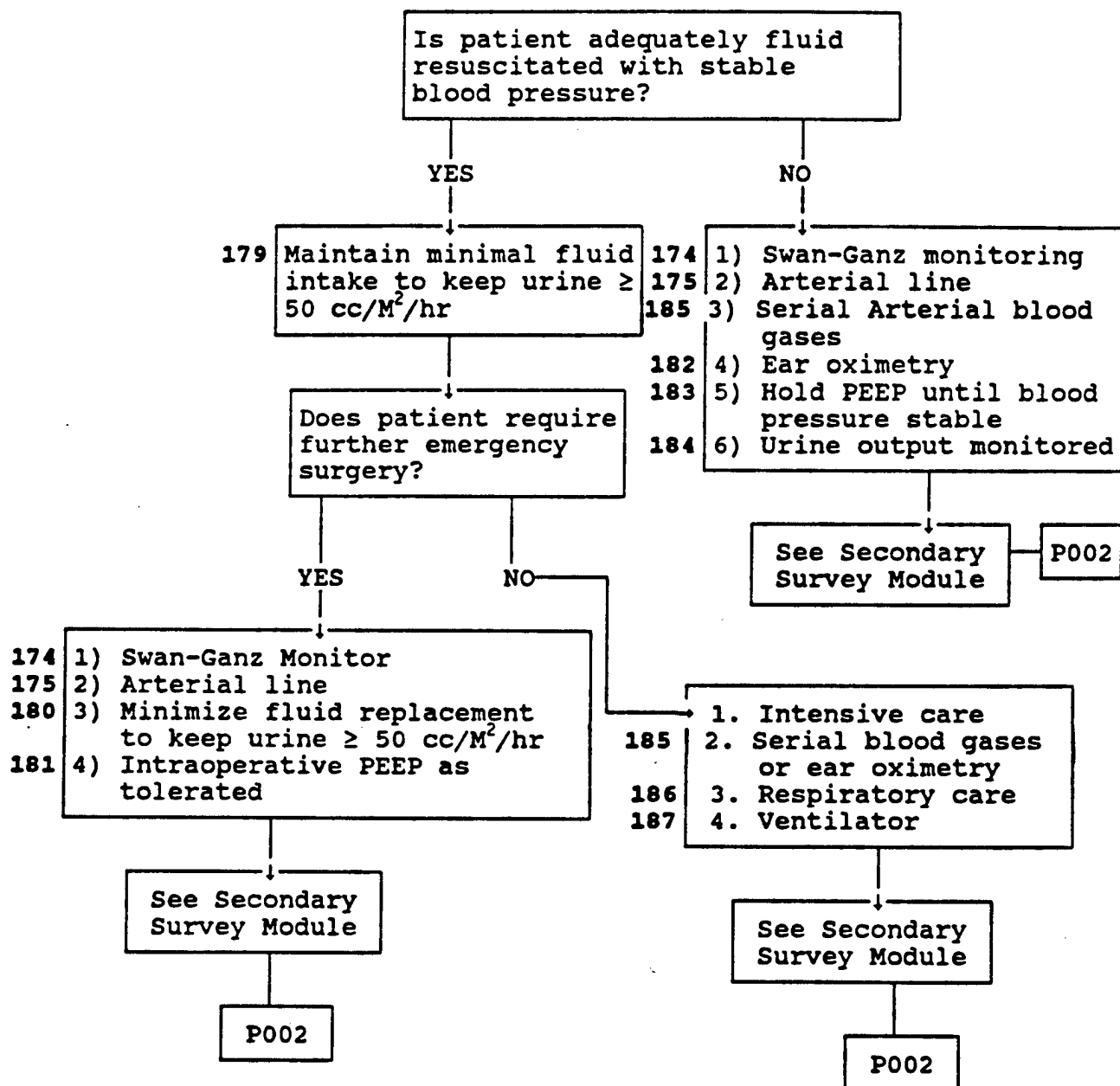
T065  
2/2



MYOCARDIAL CONTUSION MODULE



PULMONARY CONTUSION MODULE



11  
ABDOMEN

I fall upon you the thorns of life; I bleed.  
[Shelley: Ode to The West Wind]

A. Overview

Injuries to the abdomen may occur with penetrating wounds from the nipple line to the inguinal ligament. Hemorrhage from the abdominal great vessels, liver or spleen may be quickly fatal. Though isolated hemorrhage can quickly lead to shock, penetrating abdominal injuries have hemorrhage as a component of multi-organ trauma complicating evaluation and therapy.

Because of the variety of organs within the abdominal cavity, a large number of combinations of problems face the surgeon. The algorithms in this section break down the component injuries into organ systems, survey each system closely and move to the next set of problems. By following a careful systematic approach, the likelihood of missing significant intra-abdominal injury will be lessened. Missed abdominal injuries to the hepaticobiliary, pancreatic, intestinal or urologic systems find a potential common pathway of contamination, sepsis and death. The algorithms should preclude these pitfalls and provide appropriate therapeutic modalities for successful recovery.

B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .

3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .
6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:  
CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]

**C. Decision Trees**

# ABDOMEN - PROVIDER & EQUIPMENT LIST

Key to specialty codes: A - General Surgeon  
B - Specialty Surgeon  
C - Anesthesiologist  
D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Explore wound locally	2*	3				Laparotomy lists A and B
2. Diagnostic peritoneal lavage	2*	3				Peritoneal lavage list
3. Prep from clavicle to knee			3	3	1*	Laparotomy lists A and B
4. Midline incision	2*	3				Laparotomy lists A and B
5. Give Cefoxitin 2gm I.V.			3	3	1*	Laparotomy lists A and B
6. Evacuate clots and blood. Eviscerate small bowel and pack all four quadrants	2*	3				Laparotomy lists A and B
7. Gain vascular control with clamps or pressure	2*	3				Laparotomy lists A and B; Abdominal Vascular list
8. Open chest if necessary	2*	3				Abdominal Vascular list; Chest list
9. Control contamination with clamps or sutures	2*	3				Laparotomy lists A and B
10. Perform careful exploration	2*	3				
11. Control thoracic aorta or abdominal aorta at diaphragm	2*	3				Chest list; Abdominal Vascular list
12. Reflect left colon, spleen, stomach, body and tail of pancreas medially to expose aorta	2*	3				Laparotomy lists A and B; Abdominal Vascular list
13. Ligate bleeding vessels	2*	3				Laparotomy lists A and B; Abdominal Vascular list
14. Encircle aorta with umbilical tapes above and below injury. Isolate injury and place clamps proximal and distal to injury	2*	3				Laparotomy lists A and B; Abdominal Vascular list

## \*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

Although an experienced general surgeon (as indicated by 2\* in position A) is capable of performing the surgical procedures detailed in this section, specialty surgeons must be considered optimal. These specialties include vascular surgeons, urologists, gynecologist, obstetricians, colorectal surgeons and thoracic surgeons. In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks. Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.



15. Create conduit from autologous vein or artery or ligate aorta and perform extra-anatomic bypass	2*	3	Laparotomy lists A and B; Abdominal Vascular list
16. Replace aorta with prosthesis	2*	3	Abdominal Vascular list
17. Use autologous vein or artery (hypogastric) for patch. Gortex may be used if no fecal contamination present	2*	3	Laparotomy lists A and B; Abdominal Vascular list; Saphenous Vein Harvest list
18. Repair anterior aorta primarily	2*	3	Laparotomy lists A and B; Abdominal Vascular list
19. Repair injuries primarily with vascular sutures	2*	3	Laparotomy lists A and B; Abdominal Vascular list
20. Reflect cecum and right colon medially to expose vena cava	2*	3	Laparotomy lists A and B; Abdominal Vascular list
21. Ligate bleeding vessels	2*	3	Laparotomy lists A and B; Abdominal Vascular list
22. Gain proximal and distal control with finger pressure or sponge sticks	2*	3	Laparotomy lists A and B; Abdominal Vascular list
23. Repair injuries primarily with posterior injury sutured from inside through anterior injury. Then repair anterior injury	2*	3	Laparotomy lists A and B; Abdominal Vascular list
24. Repair superior vena cava injury using iliac, gastric, or infrarenal vena cava as patches or conduit	2*	3	Laparotomy lists A and B; Abdominal Vascular list
25. Repair anterior injury primarily	2*	3	Laparotomy lists A and B; Abdominal Vascular list
26. All surgical procedures for bladder injury	2*	3	Laparotomy lists A and B; Abdominal Vascular list Bladder Injury List
27. All surgical procedures for colon injury	2*	3	Bowel Injury list; Laparotomy list A and B
28. All surgical procedures for injuries of duodenum	2*	3	Laparotomy lists A and B; Bowel Injury list
29. All surgical procedures for injuries of extrahepatic biliary tract	2*	3	Laparotomy lists A and B; Extrahepatic Biliary Tract list
30. All surgical procedures for injury to female reproductive tract	2*	3	Laparotomy lists A and B; Female Reproductive Tract list
31. All surgical procedures for injuries to liver	2*	3	Laparotomy lists A and B; Liver Injury List

31a. Set up autotransfuser and use blood as available			3	1*	1*	Autotransfusion capability
31b. Place saphenous vein cutdowns and/or sub-clavian lines	2*	3	3	1*	1*	I.V. lines
31c. Type and crossmatch blood			3	1*	1*	Blood laboratory capability
31d. Place heater on Ventilator, place patient on heating blanket, warm all fluids to 40°C, lavage chest and abdomen with warm fluid			3	1*	1*	Heater; heated blanket
31e. Correct coagulopathy with component therapy	2*	3	1*	1*	1*	Blood transfusion capability
31f. Correct pH with NaHCO <sub>3</sub>	2*	3	1*	1*	1*	I.V. lines, sodium bicarbonate
32. All surgical procedures for injury to pancreas	2*	3				Laparotomy lists A and B; Liver Injury list
33. All surgical procedures for penetrating injury to pregnant patient	2*	3				Laparotomy lists A and B; Female Reproductive Tract list
34. All surgical procedures for rectal injury	2*	3				Laparotomy lists A and B; Rectal Injury lists A and B
35. All surgical procedures for injuries to kidney	2*	3				Laparotomy lists A and B; Renal Injury list
36. All surgical procedures for management of retroperitoneal hematoma	2*	3				Laparotomy lists A and B
37. All surgical procedures for injuries to small bowel and mesentery	2*	3				Laparotomy lists A and B; Bowel Injury list
38. All surgical procedures for injuries to spleen	2*	3				Laparotomy lists A and B; Spleen Injury list
38a. Give pneumovax			1*	1*	1*	Polyvalent pneumococcal vaccine (pneumovax)
38b. Blood transfusion			1*	1*	1*	Blood transfusion capability
39. All surgical procedures for injuries to stomach	2*	3				Laparotomy lists A and B; Bowel Injury list
40. All surgical procedures for ureteral injuries	2*	3				Laparotomy lists A and B; Ureteral Injury list
40a. Inject 5cc methylene blue			1*	1*	1*	Ureteral Injury list
41. All surgical procedures for visceral vascular injury	2*	3				Laparotomy list A and B
42. All surgical procedures for superficial injuries	2*	3	1*	1*	1*	Laparotomy lists A and B

# ABDOMINAL VASCULAR EQUIPMENT LIST

## SUTURE

DACRON TAPE  
VICRYL 3-0 REEL  
SILK 2-0 STRAND  
SILK 3-0 STRAND  
SILK 4-0 STRAND  
SILK 0 STRAND  
SILK 2-0 SH MULTI-PAK  
SILK 3-0 SH MULTI-PAK

## ABD. CLOSURE

PDS #1 TP-1  
VICRYL 0 CT (2)

## GROIN CLOSURE

VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES

## RETENTION

ETHILON 2 LR DA (4)

## VASCULAR

PROLENE 4-0 SH DA  
PROLENE 5-0 RB-1  
PROLENE 6-0 RB-1

## DRAPES & PACKS

MAJOR BASIN SET W/ GRADUATE & MED. CUPS  
LAPAROTOMY SHEET  
BACK TABLE COVER  
MAYO STAND COVER  
STERI DRAPE 1000  
STERI DRAPE IOBAN 6648  
STERI DRAPE ISOLATION BAG  
GOWN, SURGICAL XLRG.  
GLOVES, STERILE SURGICAL  
GLOVES, STERILE HYPO-ALL  
TOWELS, STERILE, (6)

## SPONGES

KITTNER DISECTORS  
18 X 18 LAPS. (4)  
4 X 4 X-RAY DETECT (2)

## SYRINGES & NEEDLES

SYRINGE, TB 1CC  
SYRINGE, 10CC LL  
SYRINGE, 30CC LL  
SYRINGE, 60CC LL  
IRRIGATION BULB ASEPTO  
NEEDLE, 18GA. 1 1/2"  
NEEDLE, 25GA. 5/8

## CATHETER

FOLEY CATH. TRAY  
FOLEY CATH. 16FR. THERMAL  
URIMETER DRAINAGE BAG

## SOLUTIONS

IRRG. WATER 1500CC  
IRRG. NACL 1000CC  
IV NACL 0.9% 500CC  
IV PLASMA-LYTE PH7.4 1000CC  
ALBUMIN 500CC

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL \$15  
BLADE SURGICAL #21  
SUTURE BOOTS  
VESSEL LOOPS MINI & MAXI  
HEMOCLIPS SMALL, MED., LRG.  
RAZOR, PREP.  
MAGNETIC NEEDLE MAT  
PETRIE DISH 6" STERILE  
BAG-O-JET TRANSFER SET  
STOPCOCK 3-WAY  
K-50 TUBING PENCIL, HANDSWITCH CAUTERY  
PAD, GROUNDING CAUTERY

## DRAINS

HEMOVAC, MED.  
SUMP, DUAL LUMEN

## INSTRUMENTS & EQUIPMENT

LAPAROTOMY SET  
CARDIO VASCULAR TRAY  
ABD. ANEURYSM CLAMPS  
EXTRA. LONG INST.  
PENCIL DOPPLER PROBE  
HEADLIGHT, FIBEROPTIC  
GRADUATE, 500CC  
RETR. DEEP BALFOR  
RETR. UPPER HAND  
SCISSOR, LONG METZ.  
FOGARTY HYDRAGRIPS SM., MED  
FOGARTY INSERTS SMALL  
FOGARTY INSERTS MED.  
CAUTERY MACHINE

FOGARTY CATHETERS  
EMB. 3FR, 4FR, 5FR.  
IRR. 3FR, 4FR, 5FR.

BLADDER INJURY EQUIPMENT LIST

SUTURE

-----  
DACRON TAPE  
CHROMIC 2-0 REEL  
SILK 3-0 STRAND  
SILK 3-0 SH MULTI PAK  
SILK 4-0 SH MULTI PAK  
CHROMIC 2-0 FS-1  
CHROMIC 3-0 SH  
CHROMIC 4-0 SH  
CHROMIC 4-0 RB-1

CLOSING

-----  
MAXON #1 T-20  
VICRYL 0 CT  
VICRYL 2-0 CT  
SKIN STAPLES SM-35W

DRAPES AND PACKS

-----  
MAJOR BASIN SET WITH GRADUATE 1000CC AND  
MEDIUM CUPS  
LAPAROTOMY SHEET  
BACK TABLE COVER  
MAYO STAND COVER  
MEDIUM SHEET 44" X 60"  
GOWN, SURGICAL X-LARGE (3)  
GLOVES, UNSTERILE EXAM  
GLOVES, SURGEONS, ASSORTED SIZES  
TOWELS, STERILE (6 PACK)  
SKIN PREP SET

SOLUTIONS

-----  
IRRG. WATER 1500CC  
IRRG. NACL 1000CC  
IRRG. WATER 3000CC

CATHETER

-----  
FOLEY CATHETER TRAY  
FOLEY CATHETER, 16 FR THERMA  
URIMETER DRAINAGE BAG  
CATHETER 14 FR 5CC  
CATHETER 18 FR 5CC  
CATHETER 22 FR 5CC  
CATHETER 24 FR 5CC  
CATHETER 24 FR 5CC  
CATHETER 20 FR 30CC

SPONGES

-----  
LAPS, 18 X 8 (3)  
X-RAY DETECT 4 X 4 (20)  
DISSECTORS, KITTNERS

SYRINGES AND NEEDLES

-----  
SYRINGE 10CC L.L.  
SYRINGE 30CC L.L.  
SYRINGE 60CC L.L.  
ASEPTO  
SYRINGE 60CC IRRIG. TIP  
NEEDLE 18 GA 1-1/2"

MISCELLANEOUS

-----  
BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
BLADE, SURGICAL #21  
HEMOCLIP, SMALL  
HEMOCLIP, MEDIUM  
HEMOCLIP, LARGE  
MAGNETIC NEEDLE MAT  
RAZOR, PREP  
MARLEX MESH  
VESSEL LOOPS, MINI, MAXI

DRAINS

-----  
JACKSON PRATT 7MM AND 10MM FLAT  
JACKSON PRATT RESEVOIR

CAUTERY

-----  
PAD, GROUNDING ADULT  
PENCIL, HANDSWITCH  
EXTENSION BLADE

INSTRUMENTS AND EQUIPMENT

-----  
LAPAROTOMY SET  
EXTRA LONG INSTR.  
SCISSOR, LONG METZ.  
SCISSOR, TENOTOMY LONG  
CLAMP, RUMEL THORACIC  
HEADLIGHT, FIBEROPTIC

HAVE AVAILABLE

-----  
CYSTOSCOPE TRAY, ADULT  
CYSTO SET  
NEPHROSCOPE, FLEXIBLE  
NEPHROSCOPE, ACCESSORY PAN

DRESSING

-----  
GAUZE 4 X 8" 12 PLY  
TELFA

BOWEL INJURY EQUIPMENT LIST

SUTURE

-----  
SILK 0 STRAND  
SILK 2-0 STRAND  
SILK 3-0 STRAND  
SILK 2-0 SH  
SILK 2-0 SH MULT. PAK  
SILK 3-0 SH  
SILK 3-0 SH MULTI-PAK  
VICRYL 3-0 SH  
CHROMIC 3-0 SH  
CHROMIC 4-0 SH

CLOSING

-----  
VICRYL 0 CT  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES SM-35W

SUPPLIES & INSTRUMENTS:

-----  
SEE LAPAROTOMY LIST

BOWEL CLAMPS EQUIPMENT LIST

-----  
CONTENTS  
-----

BOWEL CLAMPS:  
-----

2 ALLEN CLAMPS  
2 OCHSNERS  
2 LONG BABCOCKS  
2 SHORT BABCOCKS  
2 STRAIGHT RUBBER SHODS  
2 CURVED RUBBER SHODS  
2 LONG CURVES

CARDIO VASCULAR TRAY

BOTTOM LAYER

-----  
#7 KNIFE HANDLE  
STRULLY SCISSOR  
POTTS SCISSORS - 25, 45, 60 DEG  
NARROW TIP SUTURE SCISSOR

SECOND LAYER

-----  
30 DEG PERIPHERAL CL (BLACK)  
ACUTE ANG MINATURE CLAMPS  
STR ATRAGRIP CLAMPS  
30 DEG DEBAKEY MINATURE CLAMPS  
LONG ALLISES

THIRD LAYER

-----  
LONG ATRAGRIP TISSUE FCPS  
MED ATRAGRIP TISSUE FCPS  
SH ATRAGRIP TISSUE FCPS  
LONG FINE TIPPED N.B.  
MED N.B.  
SH FINE TIPPED N.B.

FOURTH LAYER

-----  
TANGENITAL OCCLUSION CL (LG ANG  
SATINSKY)  
SEMB CLAMP  
KIDNEY PEDICLE CLAMP

CHEST SET (THORACIC) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATRAUGRIPS

ON STRINGER

-----  
CRAFORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
MEDIUM NEEDLE HOLDERS  
LONG NEEDLE HOLDER -NOT FINE  
SPONGE STICKS  
LONG CURVES  
LAUERS  
TONSILS  
ROCKERS - CLAMP  
BABCOCK CLAMP  
ALLIS CLAMP  
CURVED CRILER  
CURVED MOSQUITOES CLAMP  
SUTURE SCISSORS  
MAYO SCISSORS  
METZ SCISSORS  
LONG METZ SCISSORS



CHEST SET (VASCULAR) EQUIPMENT LIST

BOTTOM OF PAN

-----  
BETHUNE RIB CUTTER  
GIERTZ RIB CUTTER  
DOYEN ELEVATORS (1 LT & 1 RT)  
ALEXANDER  
MATSON  
RIB APPROXIMATORS (MOVEABLE)  
ADSON RONGEUR  
TONSIL SUCTION  
VEIN RETRACTORS  
DEEP RAKES  
SCAPULA RETRACTOR

WRAP IN TOWEL

-----  
LONG FINE THUMBS W/TEETH  
LONG FINE THUMBS W/OUT TEETH  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB W/OUT TEETH  
LONG ATTRAUGRIPS

ON STRINGER

-----  
CRAFTORD CHEST SCISSOR  
EX LONG N.H.  
EX LONG FINE N.H.  
EX LONG CURVES  
EX LONG CARMALT  
REGULAR CARMALTS  
EX LONG RUMEL  
BRONCHUS CLAMPS  
RUMEL THORACIC ARTERY CLAMPS  
DUVAL LUNG CLAMPS SEMB  
SEMB  
LONG ALLISES  
TONSILS  
MEEKER  
KIDNEY PEDICAL CLAMP  
REGULAR RUMELS  
REGULAR TOWEL CLIPS

PLACE ON TOP OF TRAY

-----  
BUFORD RETRACTOR  
PEEL PACK

PLACE ON TOP W/RETR

-----  
BUFORD BLADES  
#3 LONG KNIFE HANDLE

COMMON DUCT SET

CONTENTS

-----

#3 FARR  
EXTRA LONG NEEDLE HOLDER  
LAHEY GALL DUCT CLAMPS  
TROCAR W/SHEATHS: 18FR  
DILATORS: #3-#11  
LARGE SCOOP  
SMALL SCOOPS  
SOLID PROBES  
METAL RULER  
GROOVE DIRECTOR  
RANDALL STONE FORCEPS (DIFFERENT ANGLES)

PEEL PACK INDIVIDUALLY

-----

LARGE GALLSTONE SCOOP  
FLEXIBLE GALLSTONE PROBE  
18 FR TROCAR & SHEATH  
20 FR TROCAR & SHEATH  
22 FR TROCAR & SHEATH

# EXTRAHEPATIC BILIARY TRACT EQUIPMENT LIST

## SUTURE

-----  
 SILK 2-0 STRAND  
 SILK 3-0 STRAND  
 SILK 2-0 SH  
 SILK 3-0 SH  
 SILK 4-0 RB-1 DA  
 VICRYL 5-0 RB-1

## CLOSING

-----  
 VICRYL 2-0 CT  
 VICRYL 3-0 CT  
 SKIN STAPLES SM 35W  
 PACKS & DRAPES

-----  
 MAJOR BASIN W/GRADUATE & MED CUPS  
 LAPAROTOMY SHEET  
 BACK TABLE COVER  
 MAYO STAND COVER  
 GOWN, SURGICAL XTR. LRG. (3)  
 GLOVES, SURGICAL ASSORT. SIZES  
 GLOVES, EXAM UNSTERILE  
 TOWELS, STERILE (6)  
 SKIN PREP SET

## SPONGES

-----  
 LAP 18 X 18 (4)  
 X-RAY DETECT 4 X 4  
 DISSECTORS, KITTNER'S

## SOLUTIONS

-----  
 IRRG. WATER 1500 CC  
 IRRG. NACL 1000 CC  
 IRRG. NACL 3000 CC

## SYRINGES & NEEDLES

-----  
 SYRINGE, 10 CC LL.  
 SYRINGE, 30 CC LL.  
 NEEDLE 18 GA 1 1/2"  
 SYRINGE, T.B. 1 CC

## CATHETERS

-----  
 T-TUBE 16 FR.  
 FOGARTY BILI BAL. PROBE 5 FR.  
 BAG, BILE  
 FOLEY 16 FR, THERMAL  
 FOLEY CATH KIT  
 URIMETER DRAINAGE BAG

## MISCELLANEOUS

-----  
 BLADE, SURGICAL #10  
 BLADE, SURGICAL #15  
 BLADE, SURGICAL #11  
 BLADE, SURGICAL #21  
 HEMOCLIPS, SM., MED., LRG.  
 MAGNETIC NEEDLE MAT.  
 CYSTO-Y-TUBING  
 K-50 TUBING

MARK NEEDLE 22 GA  
 SUCTION TUBING 20'

## INSTRUMENTS & EQUIPMENT

-----  
 LAPAROTOMY SET  
 EXTRA LONG INSTR.  
 COMMON DUCT SET  
 CARDIO VASCULAR SET  
 RETR. UPPER HAND.  
 RETR. WEXLER  
 HEADLIGHT, FIBEROPTIC  
 CAUTERY MACHINE  
 HEMOCLIP APPLIERS: SM., MED., LRG.

## HAVE AVAILABLE

-----  
 NEPHROSCOPE, FLEXIBLE  
 NEPHROSCOPE ACCESSORY PAN

## DRAINS

-----  
 JACKSON PRATT 7 MM & 10 MM FLAT  
 JACKSON PRATT RESEVOIR

## DRUGS

-----  
 CEPHADYL 2 GM  
 HYPAQUE 30 CC

## CAUTERY

-----  
 PAD, GROUNDING ADULT  
 PENCIL, HANDSWITCH  
 BLADE, EXTENTION

## DRESSINGS

-----  
 TELFA  
 GAUZE 4 X 6"

EXTRA LONG INSTRUMENTS

CONTENTS

---

EXTRA LONG NEEDLE HOLDER  
EXTRA LONG FINE NEEDLE HOLDER  
EXTRA LONG CURVES  
REGULAR RUMEL  
MEEKERS  
BRIDGE FORCEPS  
EXTRA LONG ALLISES  
EXTRA LONG RUSSIAN  
EXTRA LONG THUMB WITHOUT TEETH  
LONG BABCOCKS  
EXTRA LONG METZ

FEMALE REPRODUCTIVE TRACT INJURY EQUIPMENT LIST

SUTURE

-----  
 CHROMIC 3-0 REEL  
 VICRYL 0 CT-2  
 CHROMIC 2-0 REEL  
 CHROMIC 2-0 SH

DRESSING

-----  
 DRESSING, TELFA  
 GAUZE, 4 X 8 12 PLY  
 PERI-PAD, LARGE 11"

CLOSING

-----  
 CHROMIC 2-0 CT  
 VICRYL 0 MO-4  
 CHROMIC 0 CT  
 VICRYL 0 CT  
 VICRYL 2-0 CT  
 SKIN STAPLES SM-35W

DRAPES & PACKS

-----  
 BASIN SET W/ GRADUATE & MED.CUP.  
 LAPAROTOMY SHEET  
 BACK TABLE COVER  
 TOWEL'S, STERILE  
 MAYO STAND COVER  
 GOWN, SURGICAL (3)  
 SKIN PREP TRAY  
 GLOVES, SURGICAL ASSORT. SIZES

SOLUTIONS

-----  
 IRRIG. WATER 1500 CC  
 IRRIG. NACL 1000 CC

SPONGES

-----  
 LAP., 18 X 18 (3)  
 4 X 4, X-RAY DETECT  
 CYLINDRICAL, DISSECTOR

MISCELLANEOUS

-----  
 BLADE, SURGICAL #10  
 BLADE, SURGICAL #15  
 BLADE, SURGICAL #21  
 HEMOCLIP, MED.  
 HEMOCLIP, LRG.  
 MAGNETIC NEEDLE MAT  
 SUCTION TUBING 20'  
 FOLEY 16 FR THERMAL  
 FOLEY CATH KIT  
 URIMETER DRAINAGE BAG  
 PAD, GROUNDING ADULT  
 CAUTERY, PENCIL HANDSWITCH

INSTRUMENTS & EQUIPMENT

-----  
 LAPAROTOMY SET  
 GYNE LAP SPECIALS  
 DEEP BALFOUR  
 HEMOCLIP APPLIERS: MED., LRG.  
 EXTRA LONG INSTR.

DRAINS

-----  
 JACKSON PRATT 7 MM & 10 MM  
 JACKSON PRATT RESERVOIR

GYNECOLOGICAL LAPAROTOMY SPECIALS EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN  
-----

1 #2 FARR  
1 #3 FARR  
1 NARROW BALFOUR BLADE

ON STRINGER:  
-----

1 EX LONG NB  
2 HEANEY NB  
2 ANDERSON CLAMPS  
1 DBL TOOTHED TENACULUM  
4 HEANEY MUELLERS  
6 LONG OCHSNERS  
6 CURVED OCHSNERS  
2 PEANEUFF CLAMPS  
1 EX LONG SUTURE SCISSOR  
1 LONG MAYO SCISSOR  
1 JORGISON SCISSOR  
1 MAYO SCISSOR

PEEL PACK:  
-----

2 CUSHING VEIN RETR  
2 LONG THUMBS W/TEETH  
1 BURD DISECTOR  
2 MED RUSSIAN FCPS

# LAPAROTOMY EQUIPMENT LIST A

## SUTURE

SILK 2-0 STRAND  
SILK 3-0 STRAND

## STICK TIES

SILK 2-0 SH  
SILK 3-0 SH

## CLOSURE

VICRYL 0 CT  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES SM-35W

## DRAPES & PACKS

MAJ. BASIN/GRADUATE W/  
MED. CUP 60CC  
LAPAROTOMY SHEET  
BACK TABLE COVER  
TOWELS, STERILE (6)  
MAYO STAND COVER  
GOWN, STERILE XIR. LRG. (3)  
SKIN PREP TRAY  
MEDIUM SHEET 44 X 60"

## SPONGES

LAP. 18 X 18 (3)  
4 X 4 X-RAY DETECT  
CYLINDRICAL DISECTOR'S

## CAUTERY

GROUNDING PAD  
ELECTRO-CAUTERY HAND PENCIL  
CAUTERY MACHINE  
CAUTERY EXTENSION BLADE

## CATHETER

CATH. PLUG  
FOLEY CATH. TRAY  
FOLEY CATH. 16FR. THERMAL  
URIMETER DRAINAGE BAG

## GLOVES

EXAM, UNSTERILE  
SURGEONS, STERILE  
SURGEONS HYPO-ALLERG., STERILE

## SOLUTIONS

IRRIG. WATER 1500CC  
IRRIG. NACL 1000CC

## MISCELLANEOUS

BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
BLADE, SURGICAL #21  
CACROW TAPE  
HEMOCLIP, SMALL  
HEMOCLIP, MED.  
HEMOCLIP, LRG.  
RAZOR, PROP  
MAGNETIC NEEDLE MAT  
SUCTION TUBING 20'

## INSTRUMENTS & EQUIPMENT

LAPAROTOMY SET  
EXTRA LONG INSTR.  
RETR. UPPER HAND  
BOSEL CLAMPS  
HEADLIGHT, FIBEROPTIC  
DEEP BALFOR

## DRAINS

PENROSE 1" X 36"  
JACKSON PRATT, 7MM & 10MM  
JACKSON PRATT RESERVOIR  
CATH. MALCOTT 22GR.  
CATH. RED RUBBER 14FR.

## HAVE AVAIL. INTERNAL STAPLES

TA 30,55,90. - 3.5MM & 4.8MM  
TA 30,55,90/ - 3.5MM & 4.8MM  
GIA MULTI USE UNIT & GUN  
POWERED PLDS-15W

## DRUGS

CEFADYL 1GM.  
THROMBIN 10,000U

## SYRINGE

SYRINGE, 30CC LL  
SYRINGE, 60CC LL  
SYRINGE, 10CC LL  
SYRINGE, 60 CC SLIP TIP

## COLOSTOMY BAG

COLOST/TLEOST FLNG, 100MM X 4"  
COLOST/TLEOST FLNG, 70MM X 4"  
LOOP OSTOMY, 100MM  
LOOP OSTOMY, 70MM

## DRESSINGS

TELFA  
GAUZE, 4 X 8"  
ABD. STERILE

LAPAROTOMY LIST B EQUIPMENT LIST

-----  
CONTENTS  
-----

-----  
BOTTOM OF PAN:  
-----

2 ARMY/NAVYS  
2 SHARP RAKES  
1 WIDE MALLEABLE  
1 NARROW MALLEABLE  
1 WIDE DEAVER  
1 NARROW DEAVER  
1 LARGE RICHARDSON  
1 MEDIUM RICHARDSON  
1 SMALL RICHARDSON  
1 WIDE HARRINGTON  
1 NARROW HARRINGTON  
1 BALFOUR  
2 TONSIL SUCTIONS  
6 BALL CLIPS

PEEL PACK:  
-----

4 REGULAR TOWEL CLIPS  
2 #3 KNIFE HANDLES  
1 #4 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
1 LONG THUMBS WITHOUT TEETH  
2 LONG RUSSIANS  
2 FINE GYNES  
2 ADSONS WITH TEETH  
2 LONG ATRAGRIPS  
1 POOL SUCTION

WRAP IN TOWEL:  
-----

2 MEDIUM HEMOCLIP APPLIERS - LONG  
  
2 MEDIUM NEEDLE HOLDERS  
2 LONG NEEDLE HOLDERS - NOT FINE  
2 SPONGE STICKS  
4 LONG CURVES  
4 LAUERS  
4 TONSILS  
4 ROCKERS  
2 BABCOCKS  
4 ALLISES  
10 CURVED CRILES  
4 CURVED MOSQUITOES  
1 SUTURE SCISSOR  
1 MAYO SCISSOR  
2 METZ SCISSORS  
1 LONG METZ SCISSOR



LIVER INJURY EQUIPMENT LIST

SUTURE

-----  
DACRON TAPE  
SILK 0 STRAND  
SILK 2-0 STRAND  
SILK 3-0 STRAND  
SILK 4-0 STRAND  
SILK 2-0 SH MULTI-PAK  
SILK 3-0 SH MULTI-PAK  
CHROMIC #1 BP LIVER

CLOSING

-----  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
PDS #1 TP-1  
SKIN STAPLES SM-35W

DRAPES & PACKS

-----  
MAJOR BASIN SET W/ GRADUATE &  
MED. CUPS  
LAPAROTOMY SHEET  
BACK TABLE COVER  
MAYO STAND COVER  
MEDIUM SHEET 44 X 60"  
GOWN, SURGICAL XTR LRG. (3)  
GLOVES, SURGICAL ASS. SIZES  
GLOVES, EXAM UNSTERILE  
TOWELS, STERILE (6)  
PREP SET

SPONGES

-----  
LAP. 18 X 18 (4)  
4 X 4 X-RAY DETECT  
PEANUT DISSECTORS

SYRINGES & NEEDLES

-----  
SYRINGE, 10 CC W/ 21 ga. 1 1/2"  
SYRINGE, 30 CC LL  
SYRINGE, 60 CC LL  
NEEDLE, 18 ga. 1 1/2"  
NEEDLE, 25 ga. 5/8"

CATHETER

-----  
FOLEY CATH. TRAY  
FOLEY CATH. 16FR. THERMAL  
URIMETER DRAINAGE BAG

SOLUTIONS

-----  
IRRIG. WATER 1500 CC  
IRR. NACL 1000 CC

MISCELLANEOUS

-----  
BLADE, SURGICAL #10  
BLADE, SURGICAL #15  
BLADE, SURGICAL #21  
SUTURE BOOTS  
VESSEL LOOPS, MINI & MAXI

HEMOCLIPS, SM., MED., & LRG.  
RAZOR, PREP  
MAGNETIC NEEDLE MAT  
PENCIL, HANDSWITCH CAUTERY  
PAD, GROUNDING CAUTERY  
AUTO-TRANSFUSION SUPPLIES

DRUGS

-----  
THROMBIN 10,000 U  
HEPARIN 10,000 U  
SURGICEL GAUZE  
GELFOAM #100

INSTRUMENTS & EQUIPMENT

-----  
LAPAROTOMY SET  
CARDIOVASCULAR TRAY  
EXTRA LONG INSTR.  
HEADLIGHT FIBEROPTIC  
BARNES SAW (HOLD)  
RETR. UPPER HAND  
SCISSOR, LONG METZ.  
LIVER CLAMP  
THORACIC ANEURYSM CLAMPS  
CAUTERY MACHINE  
ARGON BEAM COAGULATOR (IF POSS.)  
HEMOCLIP APPLIERS, SM., MED., LRG.  
CHEST SET

ADD. SUPPLIES

-----  
MARLEX MESH  
HYPOTHERMIA WARMING BLANKET  
BLOOD WARMER (3)  
RAPID INFUSION WARMER I.V.

DRAINS

-----  
HEMO-VAC, MED.  
SUMP, DUAL LUMEN  
MEDIASTINAL TUBE (HOLD)  
CHEST DRAINAGE SYSTEM (HOLD)

DRESSINGS

-----  
TELEFA  
4 X 8 GAUZE  
ABO, STERILE  
RETENTION STRAPS

PERINEAL SET EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

2 SMALL RIGHT ANGLE RETRACTORS  
2 LARGE RIGHT ANGLE RETRACTORS  
2 SHARP RAKES  
2 DEEP RAKES  
1 TURNER WARWICK RETROGRADE BOUGIE  
    (BLACK) DOWNS SURG.  
    EH 040 010

ON STRINGER:  
-----

2 LONG NEEDLE HOLDERS  
2 SPONGE STICKS  
4 LONG CURVES  
8 ALLISES  
6 CURVED CRILES  
1 LONG MAYO SCISSOR  
1 REGULAR MAYO SCISSOR  
1 SUTURE SCISSOR

PEEL PACK:  
-----

1 #3 KNIFE HANDLE  
1 #3 LONG KNIFE HANDLE  
2 LONG ATRAGRIP FORCEPS  
2 LONG THUMBS WITHOUT TEETH  
2 FINE GYNE FORCEPS

PERITONEAL LAVAGE EQUIPMENT LIST

SUTURE

---

VICRYL 2-0 SR  
ETHILON 4-0 FS-Z

DRAPES & SUPPLIES

---

TOWELS, STERILE  
DRAPE, FENESTRATED  
MAYO STAND COVER  
SKIN PREP TRAY  
4 X 4 X-RAY DETECT  
GOWN, SURGICAL XR. LRG. (2)  
GLOVES, SURGICAL ASSORT. SIZES  
CAUTERY PENCIL, HANDSWITCH  
PAD, GROUNDING ADULT  
BLADE, SURGICAL #10 & #15  
TUBING, I.V.  
IMPERSOL LAVAGE CATH 11 FR.  
0.9% NACL IV 1000 CC  
O.P. SITE

INSTRUMENTS & EQUIPMENT

---

TRAUMA TRAY  
CAUTERY MACHINE

RECTAL SET A EQUIPMENT LIST

SUTURE

-----  
CHROMIC 2-0 SR  
CHROMIC 2-0 REEL  
VICRYL 3-0 SR  
VICRYL 2-0 CT  
ETHILON 5-0 PS-Z

DRAPES & PACKS

-----  
BASIN SET W/ GRADUATE & MED.CUP.  
PERI-GYN SHEET  
BACK TABLE COVER  
MAYO STAND COVER  
TOWELS, STERILE (6)  
GOWN, SURGICAL XTR. LRG.  
GLOVES, SURGEON ASSORT. SIZES

SPONGES

-----  
LAP, 12 X 12 (3)  
4 X 4, X-RAY DETECT

SOLUTIONS

-----  
IRRIG. WATER 1500 CC  
IRRIG. NACL 1000 CC  
BETADINE PAINT 30 OZ.

CAUTERY

-----  
PAD, GROUNDING  
PENCIL, HANDSWITCH  
BLADE, EXTENTION

MISCELLANEOUS

-----  
BLADE, SURGICAL #15 (2)  
SUCTION TUBING 20'  
HEMOCLIP, MED.  
HEMOCLIP, LRG.  
MAGNETIC NEEDLE MAT  
HEADLIGHT, FIBEROPTIC

INSTRUMENT & EQUIPMENT

-----  
LAPAROTOMY SET  
RETR., RECTAL  
HEMOCLIP APPLIERS, MED., LRG.

INTERNAL STAPLES HAVE AVAIL:

-----  
TA 30, 55, 90 - 3.5 MM & 4.8 MM  
GIA MULTI USE UNIT & GUN

COLOSTOMY BAG

-----  
COLOST / ILEOST FLANGE KIT  
100 MM X 4" / 70 MM X 4"

DRESSINGS

-----  
XEROFOAM 7 X 4"  
PACKING GAUZE, IODOPHORM 1"  
FLUFF 36" X 36"

RECTAL SET B EQUIPMENT LIST

-----  
CONTENTS  
-----

BOTTOM OF PAN:  
-----

1 BOUIE-SMITH RETRACTOR  
2 SAWYER RETRACTORS  
1 RECTAL SPECULUM  
1 EATON ANALSCOPE  
4 BALL CLIPS

PEEL PACK:  
-----

1 REGULAR PROBE  
1 LONG PROBE (TAPED)  
1 #3 LONG KNIFE HANDLE  
2 LONG THUMBS WITHOUT TEETH  
2 ADSONS WITH TEETH  
1 CRYPT HOOK (TAPED)  
1 FISTULOTOMY HOOK  
1 POOLE SUCTION  
2 SENNS RETRACTORS  
1 #7 KNIFE HANDLE  
1 GROOVE DIRECTOR  
1 #3 KNIFE HANDLE

ON STRINGER:  
-----

1 LONG NEEDLE HOLDER  
2 MEDIUM NEEDLE HOLDERS  
1 METZ SCISSOR  
1 MAYO SCISSOR  
1 SUTURE SCISSOR  
1 HEMORRHOID CLAMP  
2 SHORT PENNINGTONS  
2 LONG PENNINGTONS  
6 RECTAL ALLISES

-----  
CONTENTS  
-----

4 REGULAR ALLISES  
4 CURVED CRILES  
4 BABY TOWEL CLIPS  
1 SMALL SCISSOR (DR. SMILEY'S)

# RENAL INJURY EQUIPMENT LIST

## SUTURE

### 18" TIES

- \_\_\_\_\_ 1 EACH SILK 2-0 STRAND
- \_\_\_\_\_ 1 EACH SILK 3-0 STRAND
- \_\_\_\_\_ 1 EACH SILK 4-0 STRAND

### 30" TIES

- \_\_\_\_\_ 1 EACH SILK 0 STRND
- \_\_\_\_\_ 1 EACH SILK 2-0 STRAND
- \_\_\_\_\_ 1 EACH SILK 1 STRAND
- \_\_\_\_\_ 1 EACH CHROMIC 2 STRAND
- \_\_\_\_\_ 1 EACH CHROMIC 3-0 SE
- \_\_\_\_\_ 1 EACH DACRON TAPE

### FOR DRAIN

- \_\_\_\_\_ 1 EACH SILK 3-0 X-1

### CLOSURE

- \_\_\_\_\_ 1 EACH VICRYL 1 CT
- \_\_\_\_\_ 4 EACH VICRYL 0 CT
- \_\_\_\_\_ 1 EACH VICRYL 3-0 CT

### GLOVES

- GLOVES, EXAM LRG UNSTERILE
- GLOVES, SURGICAL, ASSORTED SIZES
- GLOVES, ULTRADERM

### CAUTERY

- 1 EACH CAUTERY MACHINE
- 1 EACH PAD, GROUNDING ADULT
- 1 EACH TIP CLEANER, ELECTRO SURG
- 1 EACH ELECTRODE, BLADE EXTENDED

### SPONGES AVAILABLE

- 2 EACH SPONGES, GAUZE X-RAY DETECT
- 3 EACH SPONGES, LAP 18\*18
- 1 EACH SPONGES, PEANUT DISSECTORS

### HEMOCLIPS

- 1 PK HEMOCLIP, SM
- 1 PK HEMOCLIP, MED
- 1 PK HEMOCLIP, LRG

### SOLUTIONS

- 1 EACH SOLUTION, IRRIG WATER 1500 ML
- 1 EACH SOLUTION, IRRIG NACL 1000

### FOLEY CATHETER

- 1 EACH TRAY, CATH FOLEY UNIVERSAL
- 1 EACH CATHETER, FOLEY W/T SENS 16FR3C
- 1 EACH URIMETER, DRAIN BAG

## DRAINS

- 1 EACH DRAIN, PEN STER 3/4 X 12"

## INSTRUMENTS AND EQUIPMENT

- 1 EACH LAPAROTOMY SET
- 1 EACH CARDIOVASCULAR TRAY
- 1 ST INSTRUMENT SET, EXTRA LONG
- 1 EACH APPLIER, HEMOCLIP, LARGE, LONG
- 1 EACH SLUSH MACHINE AND PAN

## HAVE AVAILABLE

- NEPHROSCOPE, FLEXIBLE
- CHEST SET

## DRESSINGS

- 2 EACH DRESSING, GAUZE 4\*8 12 PLY
- 1 EACH DRESSING, FLUFF 36\*36 (STERILE)
- 1 EACH DRESSING, SURGIPAD 8\*10

## SPECIALS

- SLUSH MAY BE NEEDED FOR PARTIAL NEPHRECTOMY
- HAVE AUTO-TRANSFUSION SUPPLIES AVAILABLE

SAPHENOUS VEIN HARVEST EQUIPMENT LIST

SUTURE

-----  
SILK 4-0 STRAND  
SILK 2-0 STRAND  
PROLENE 5-0 RB-Z  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
VICRYL 4-0 FS-Z

DRAPES & SUPPLIES

-----  
DRAPE, SPLIT SHEET  
MEDIUM, SHEET 44 X 60"  
MAYO STAND COVER  
BASIN SET W/GRADUATE & MED CUP  
4 X 4 X-RAY DETECT  
SAPHENOUS VEIN CANNULA  
GOWN, SURGEON'S XTR. LRG. (2)  
GLOVES, SURGEON'S. ASSORT. SIZES  
SYRINGE, 30 CC L.L.  
CAUTERY, HANDSWITCH PENCIL  
PAD, GROUND ADULT  
0.9% NACL 500 CC  
BAG-O-JET TRANSFER UNIT  
BLADE, SURGICAL #10 (2)  
SYRINGE, 10 CC W/ 21 GA 1 1/2"  
NEEDLE

INSTRUMENTS

-----  
TRAUMA TRAY  
CAUTERY MACHINE

DRUGS

-----  
HEPARIN 10,000 U  
BACITRACIN 50,000 U

DRESSINGS

-----  
TELFA  
ELASTIC BANDAGE 4" & 6"

SPLEEN INJURY EQUIPMENT LIST

SUTURE

---

SILK 2-0 STRAND  
SILK 3-0 STRAND  
SILK 2-0 SH MULTI-PAK  
SILK 3-0 SH MULTI-PAK  
SILK 0 STRAND  
VICRYL 3-0 SH

CLOSING

---

VICRYL 0 CT  
VICRYL 2-0 CT  
VICRYL 3-0 CT  
SKIN STAPLES SM - 35 W

SUPPLIES & INSTRUMENT

---

SEE LAPAROTOMY LIST



# URETERAL INJURY EQUIPMENT LIST

## IF DOING CYSTOSCOPY

-----  
CYSTO SET  
CYSTOSCOPE TRAY, ADULT  
URETHROSCOPE DIRECT VISION  
SET, IRRIG TUR Y-TYPE  
SOLUTION, IRRIG WATER 3000ML

## SUTURE

-----  
1 PLAIN L-102G 3-0 REEL  
2 CHROMIC 817H 0 CP-1  
1 CHROMIC S-115H 1 STRAND  
2 VICRYL J- 359H 1 CT  
1 STAPLE GUN, SKIN SM-35W  
2 CHROMIC U-255H 2-0 UR-4  
2 CHROMIC U 203 H 4-0 RB-1

## SUPPLIES

-----  
1 DRAPE, PERI/GYN  
1 BASIN, SET WITH GRADUATE AND MED. CUPS  
1 SHEET, TRANSVERSE LAP  
1 COVER, MAYO STAND  
1 TRAY, SKIN SCRUB  
1 TOWELS, STERILE (6 PACK)  
3 GOWNS, STERILE BACK XL  
1 SYRINGE, IRRIGATION-BULB ASEPTO  
1 RAZOR, PREP DISP  
1 SUCTION TUBING 20'  
1 SYRINGE, 10CC LL  
1 SYRINGE, 30CC LL  
1 NEEDLE, 18 GA. 1-1/2  
1 DRAIN, PEN STER 1/4\*12  
1 BLADE, SURGICAL #15  
1 SYRINGE, CONTROL 10CC  
1 HEMOCLIP, MED  
1 HEMOCLIP, LRG  
1 APPLIER, HEMOCLIP, LARGE, LONG  
1 APPLIER, HEMOCLIP, MEDIUM, LONG  
1 SPONGE, GAUZE X-RAY DETECT  
1 SPONGE, KITTNER DISECTORS  
3 SPONGES, 18 X 18

## GLOVES

-----  
1 GLOVES, EXAM LRG UNSTERILE  
1 GLOVES, SURGEONS, ASSORTED SIZES

## CAUTERY

-----  
1 CAUTERY MACHINE  
1 PAD, GROUNDING ADULT  
1 PENCIL, HANDSWITCH

## SOLUTIONS

-----  
1 SOLUTION IRRIG WATER 1500ML  
1 SOLUTION IRRIG NACL 1000

## CATHETERS

-----  
1 CATHETER, 18FR 5CC  
1 CATHETER, 20FR 5CC  
1 CATHETER, 22FR 5CC  
1 CATHETER, 22FR 30CC  
1 CATH, PLUG (STERILE)  
1 URIMETER, DRAIN BAG  
1 BAG, URINARY DRAIN

## INSTRUMENTS

-----  
1 UROLOGICAL LAPAROTOMY SPECIALS  
1 LAPAROTOMY SET  
1 PERINEAL SET

## DRESSINGS

-----  
1 DRESSING, TELFA  
1 DRESSING, GAUZE 4\*8 12 PLY  
1 DRESSING, FLUFF 36 X 36 (STERILE)  
1 DRESSING, SURGIPAD 8\*10

## DRUGS

-----  
METHYLENE BLUE

UROLOGICAL LAPAROTOMY SPECIALS EQUIPMENT LIST

CONTENTS

-----  
BOTTOM OF PAN:  
-----

2 WIDE RAKES  
2 GREEN GOITER RETRACTORS

WRAP IN TOWEL  
-----

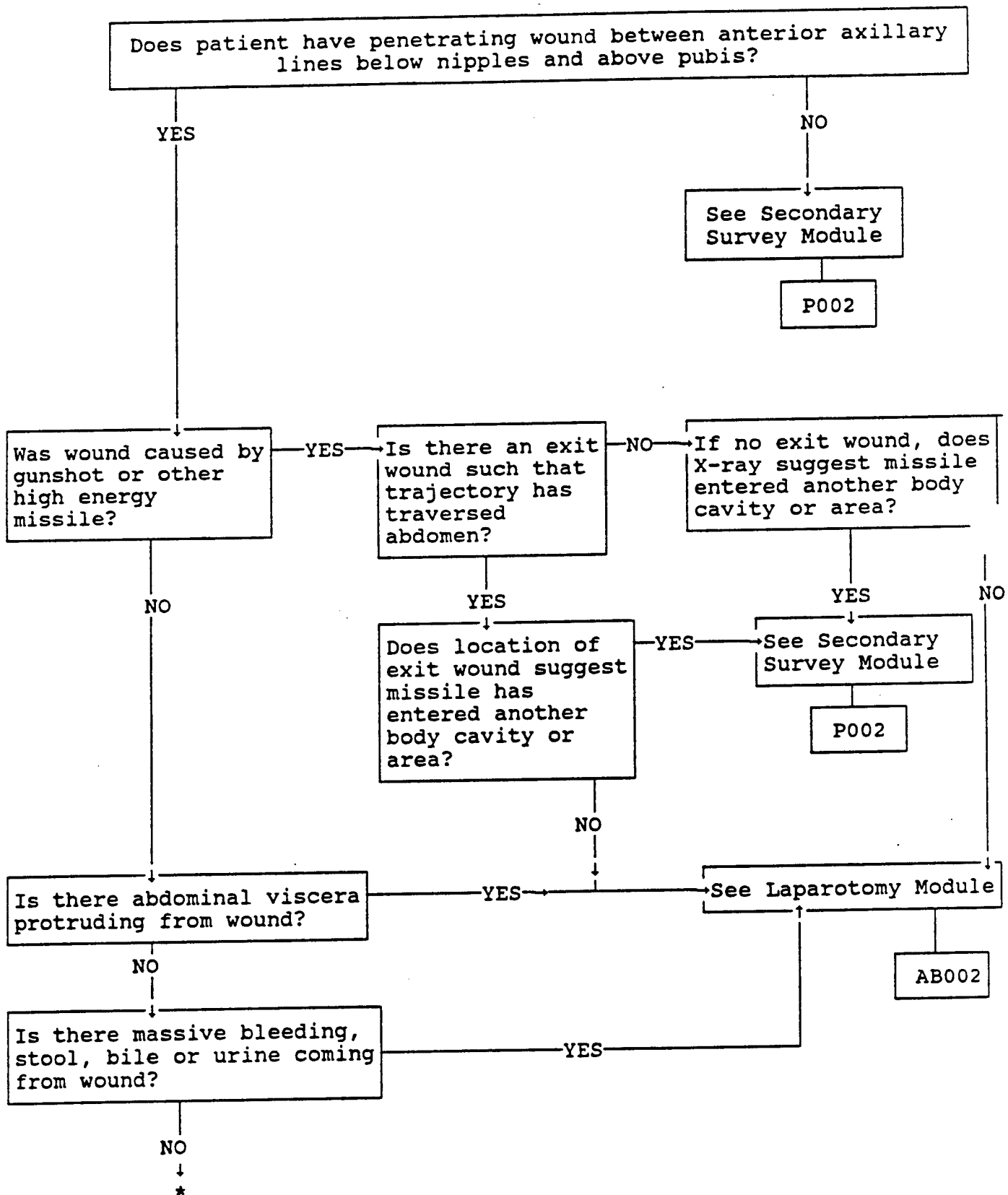
2 VEIN RETRACTORS  
1 DULL NERVE HOOK  
1 #12 FRAZIER SUCTION  
1 METAL RULER  
1 STR NERVE ROOT RETR  
1 ANG NERVE ROOT RETR  
2 SHORT THUMBS W/OUT TEETH  
2 MARTIN THUMBS  
2 SINGLE SKIN HOOKS

ON STRINGER:  
-----

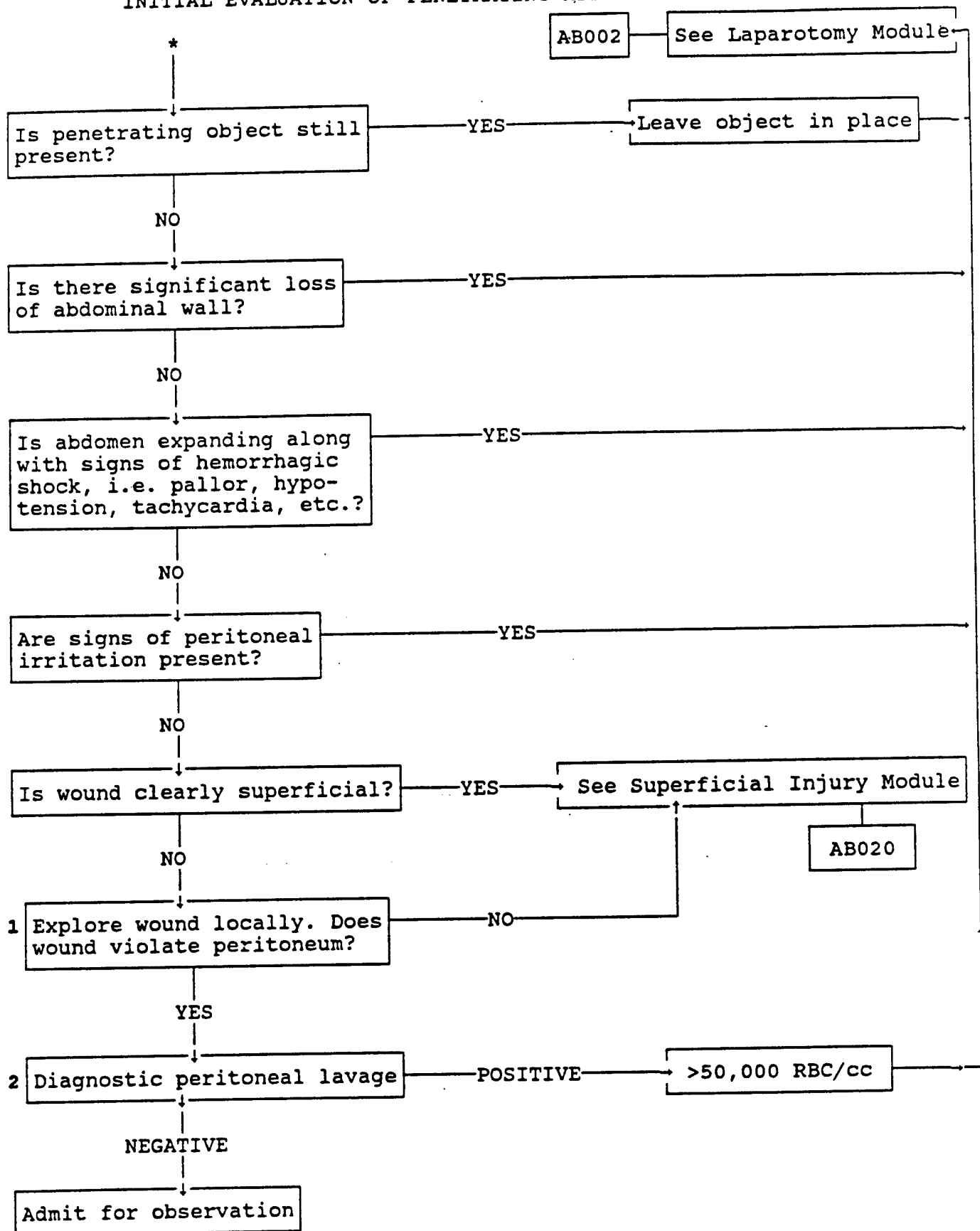
1 SINGLE TOOTHED TENACULUM  
1 DOUBLE TOOTHED TENACULUM  
2 KIDNEY PEDICLE CLAMPS  
3 RANDALL STONE FCP-DIFF ANG  
2 TONSIL HEMOSTATS  
2 HEANEY CLAMPS  
6 REGULAR ALLISES  
6 CURVED CRILES  
4 LONG ALLISES

INITIAL EVALUATION OF PENETRATING ABDOMINAL WOUND MODULE

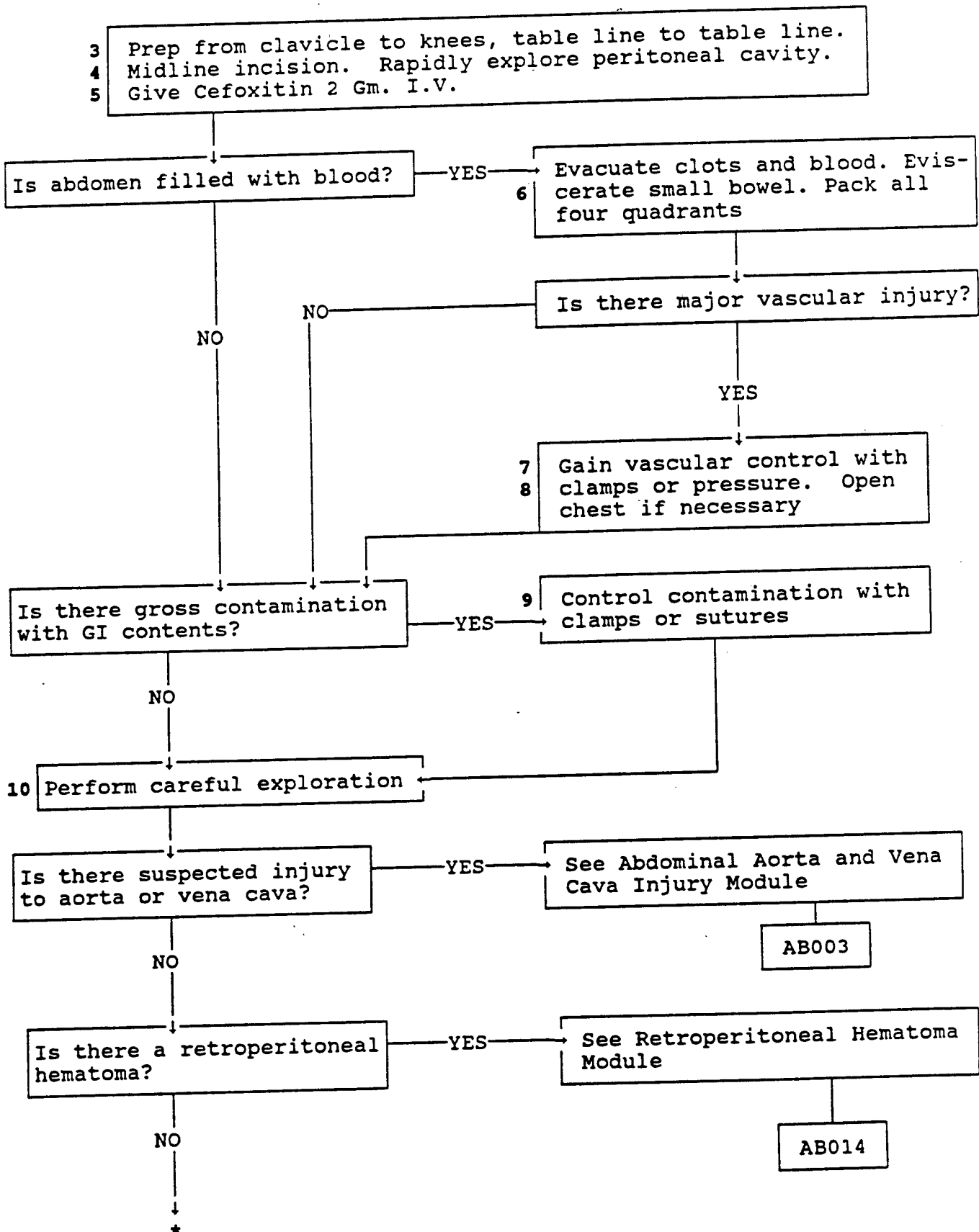
Assume patient is naked and lying supine. Assume ABC's of trauma care have been done.



# INITIAL EVALUATION OF PENETRATING ABDOMINAL WOUND MODULE

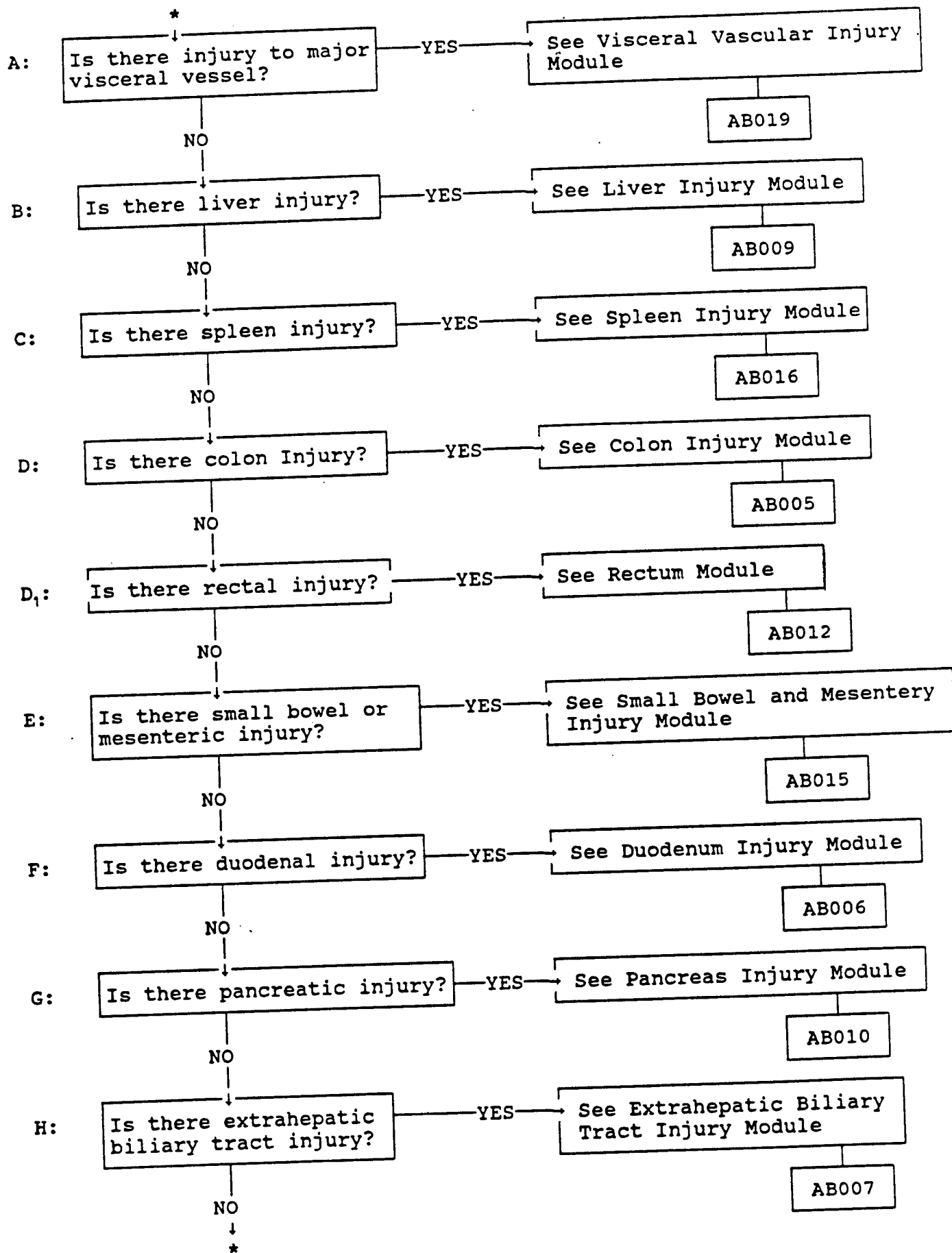


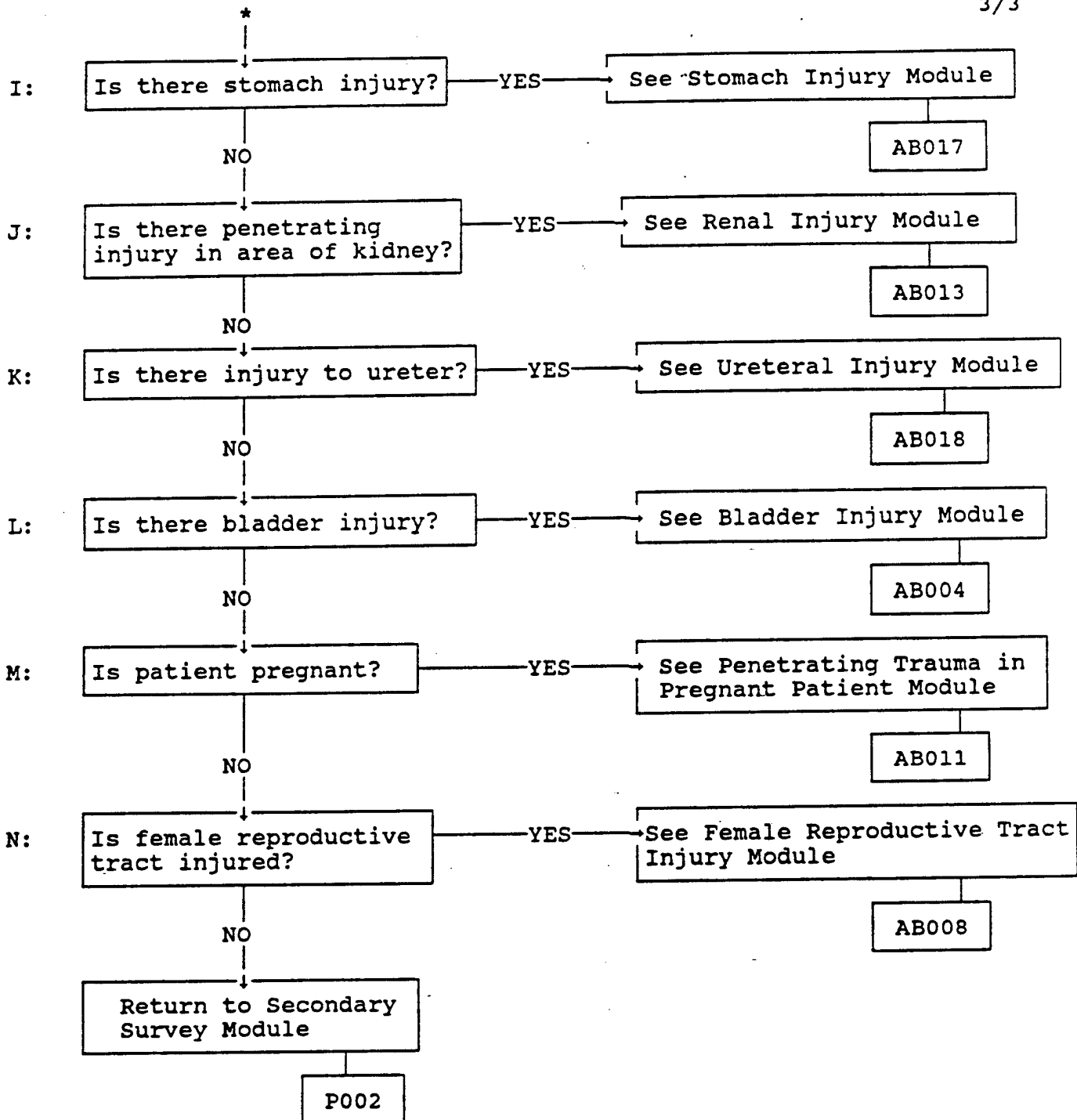
LAPAROTOMY MODULE



# LAPAROTOMY MODULE

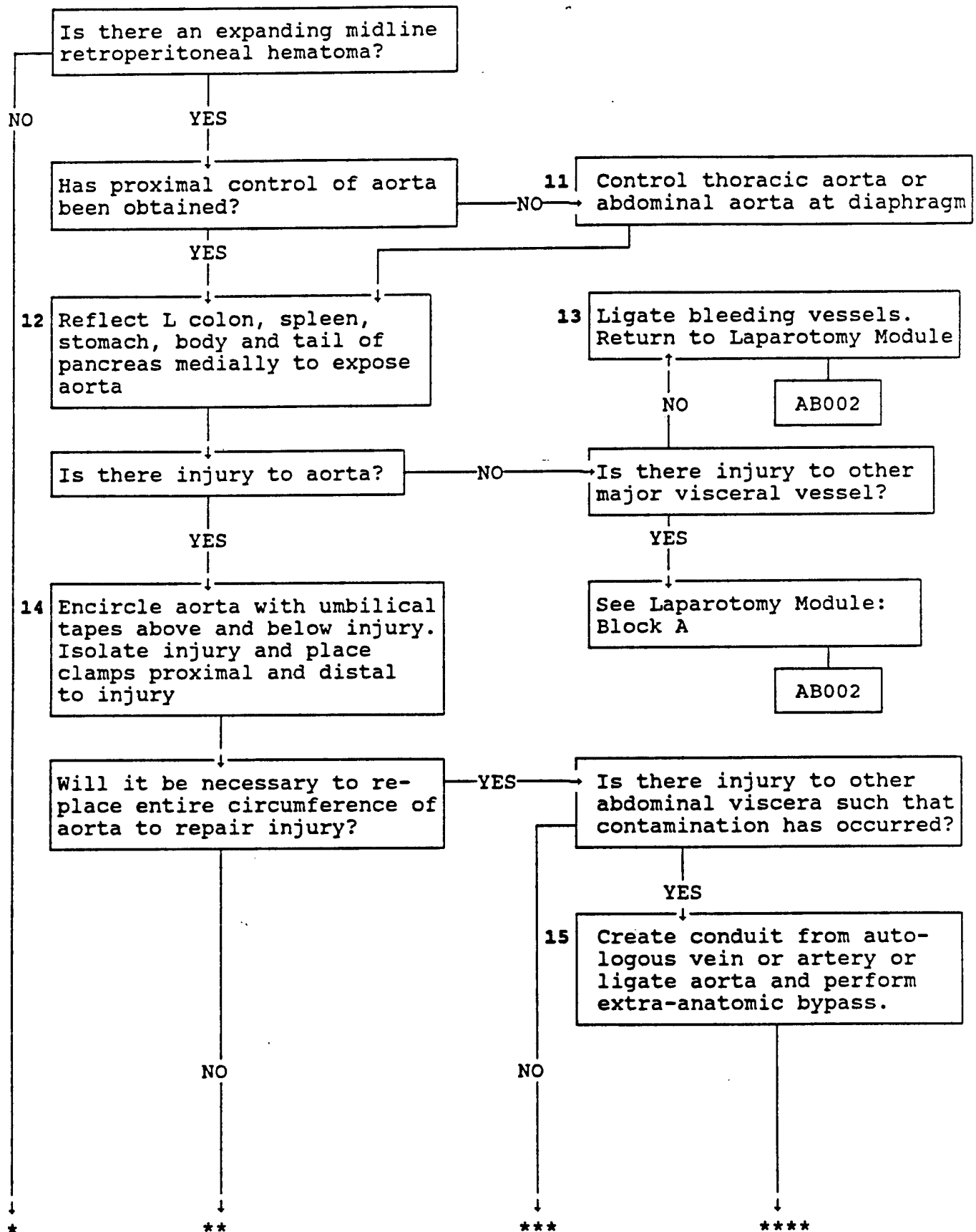
AB002  
2/3





ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE

(∞)





AB003  
2/5

AB002

See Laparotomy Module: Block A

16 → Replace aorta with prosthesis

17 Use autologous vein (saphenous)  
or artery (hypogastric) for  
patch. May use Goretex if no  
fecal contamination present

Does injury require small patch for repair?

NO

Is there simple penetrating injury to anterior aorta?

→ See Laparotomy Module: Block A

AB002

18 Repair anterior  
aorta primarily

YES

Is there corresponding posterior injury?

19	Repair injuries primarily with vascular suture
----	--

(ooo)

Is there right sided stable  
retroperitoneal hematoma?

NO → Return to Laparotomy Module

AB002

**YES**

20 Reflect cecum and right colon medially to expose vena cava

21 | Ligate bleeding vessels and  
return to Laparotomy Module

**AB002**

NO

Is vena cava injured?

**-NO**

Are other visceral vessels injured?

**YES**

See Visceral Vascular  
Injuries Module

AB019

**YES**

Is suprarenal vena cava injured?

NO

**YES**



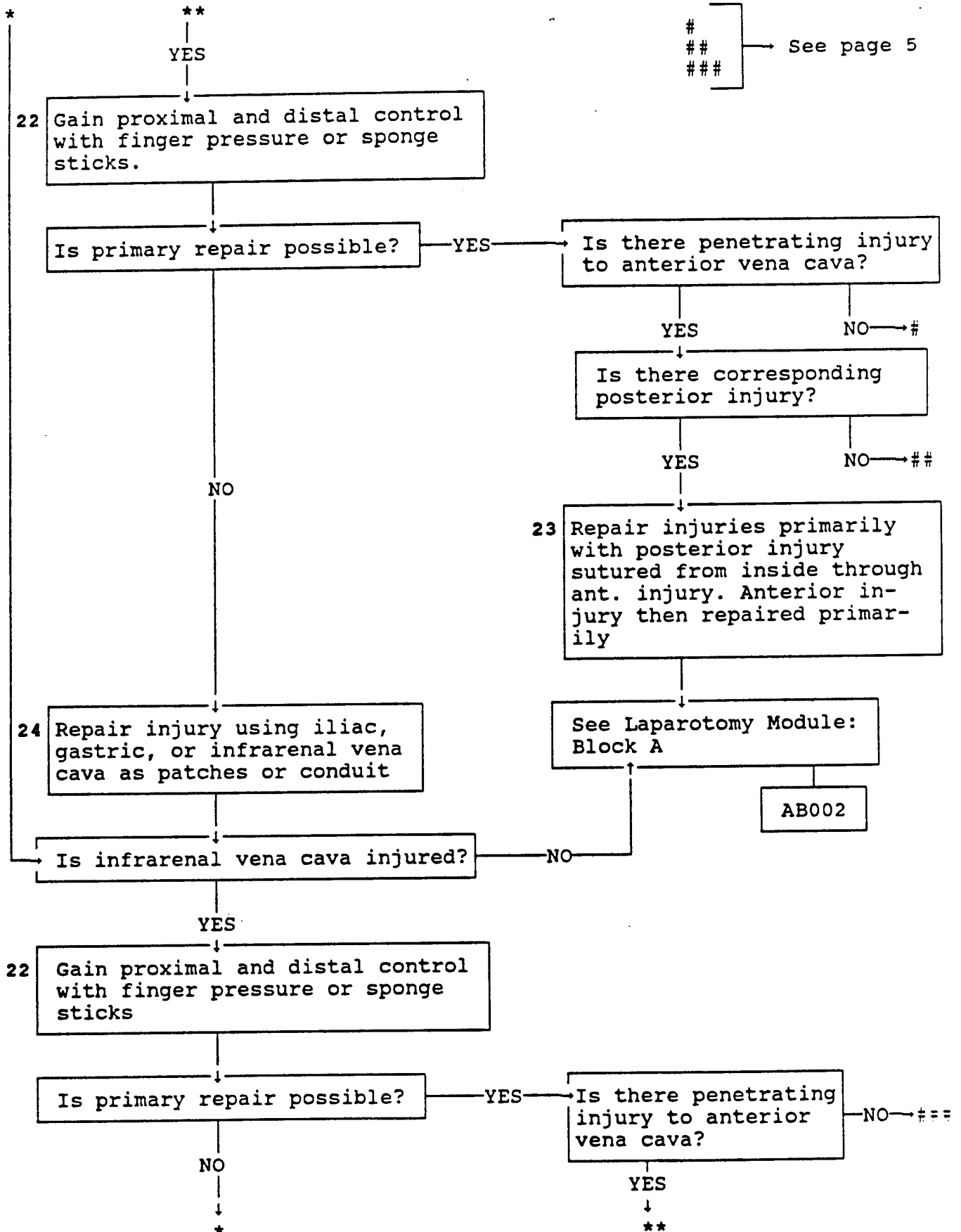
✱ ✱

NO

\*\*\*

\* \* \* \*

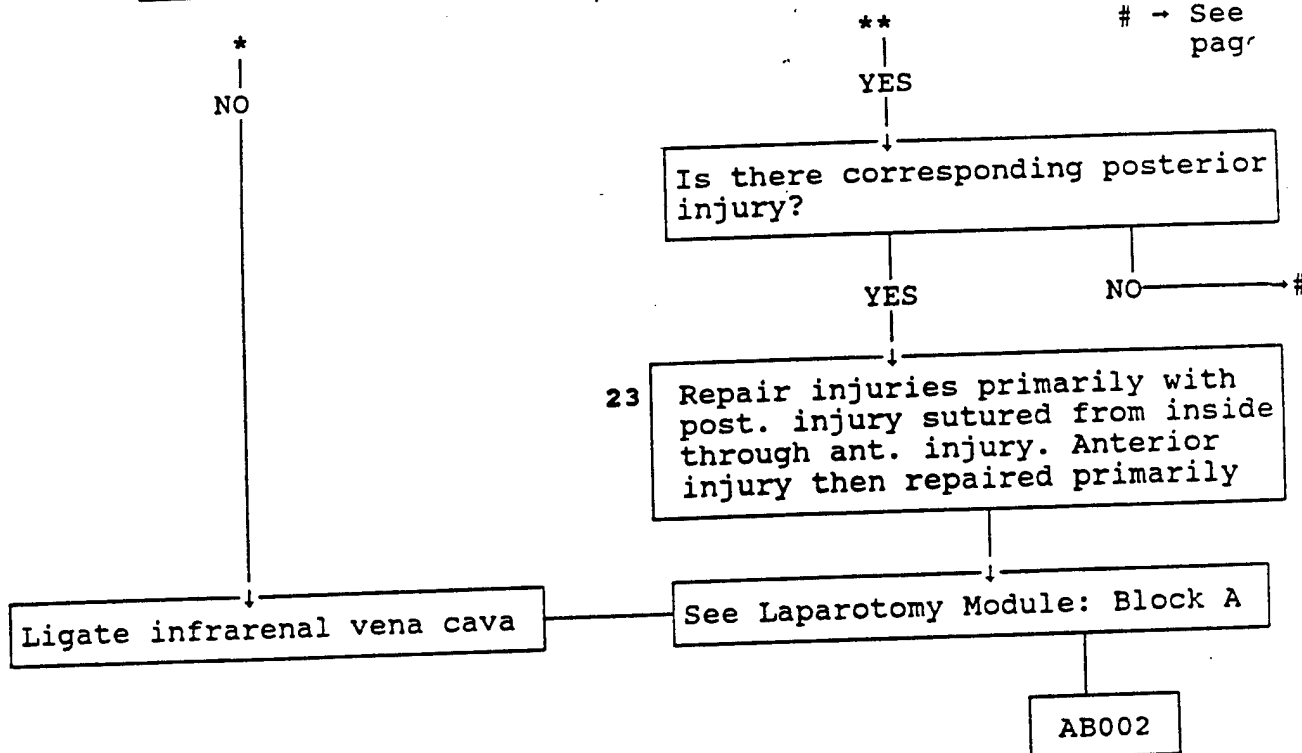
ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE



ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE

AB003  
4/5

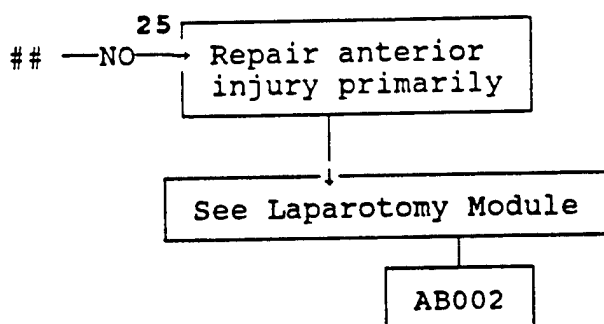
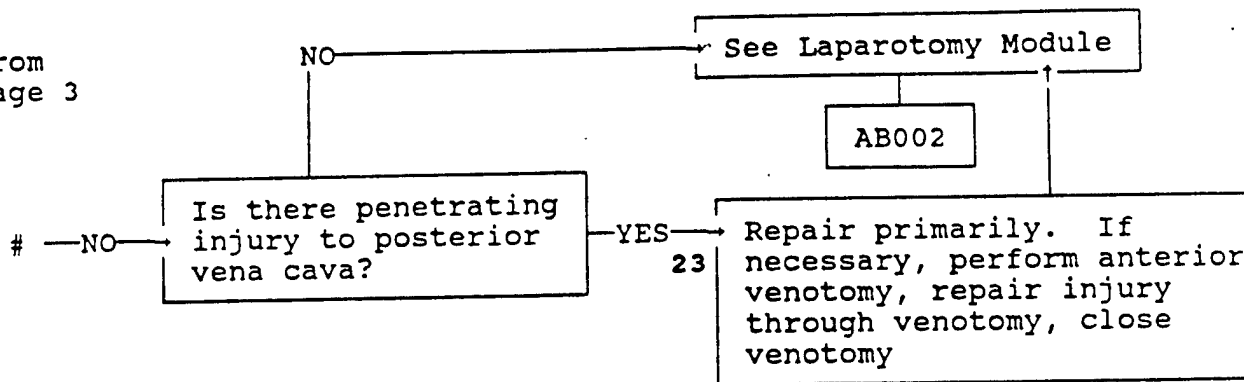
# → See  
page



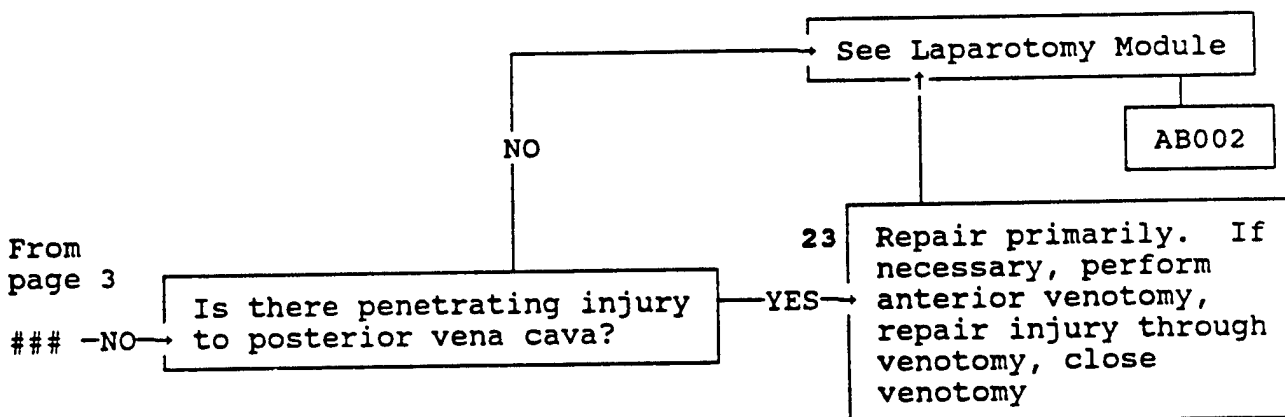
# ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE

AB003  
5/5

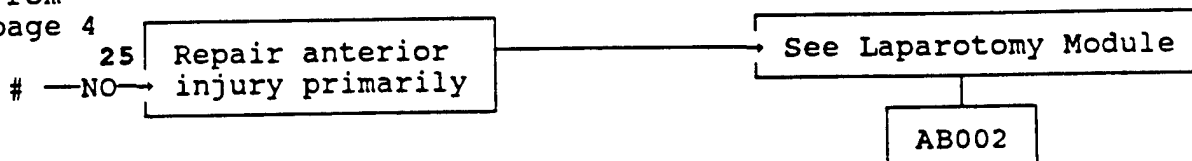
From  
page 3



From  
page 3

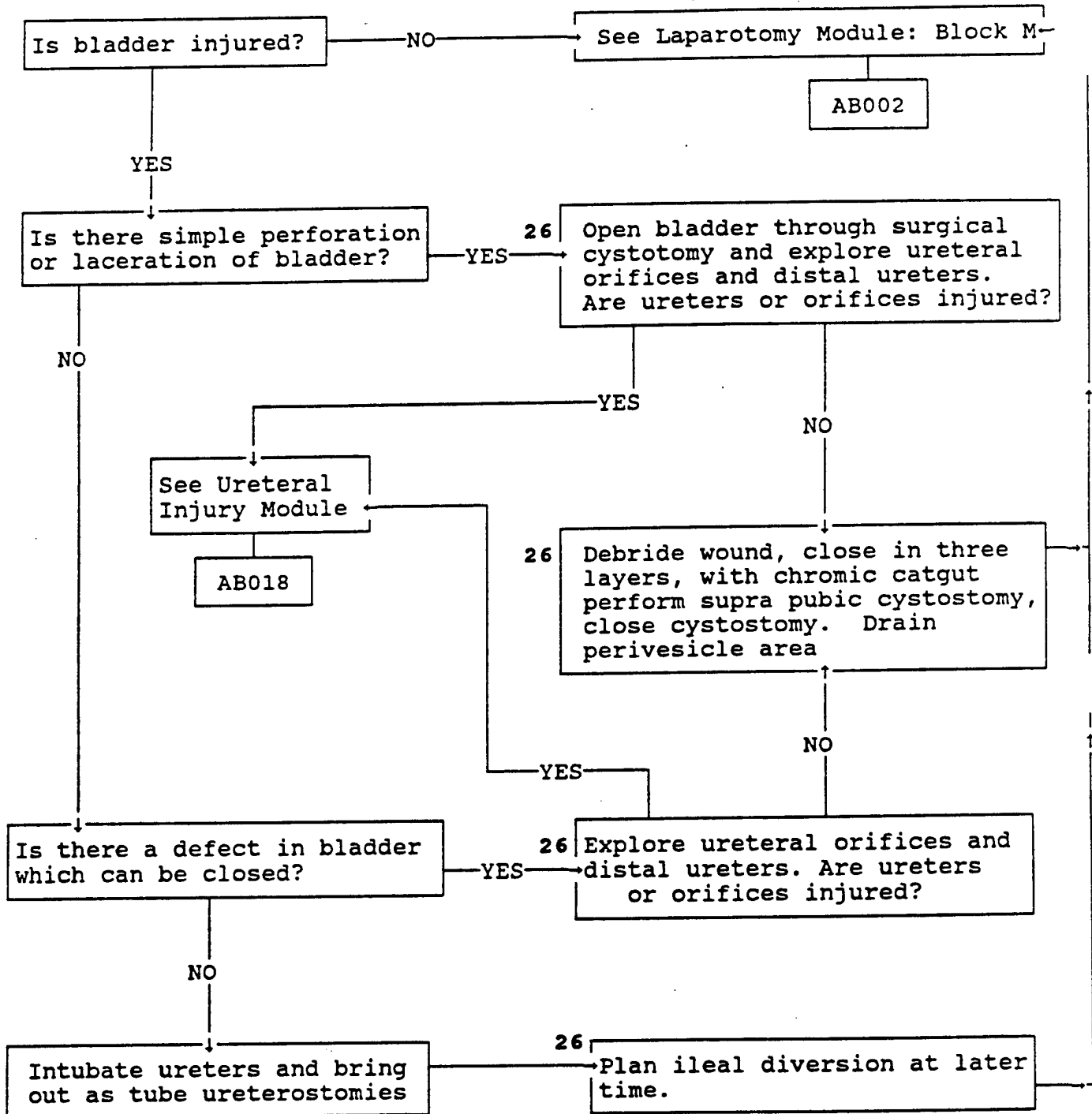


From  
page 4

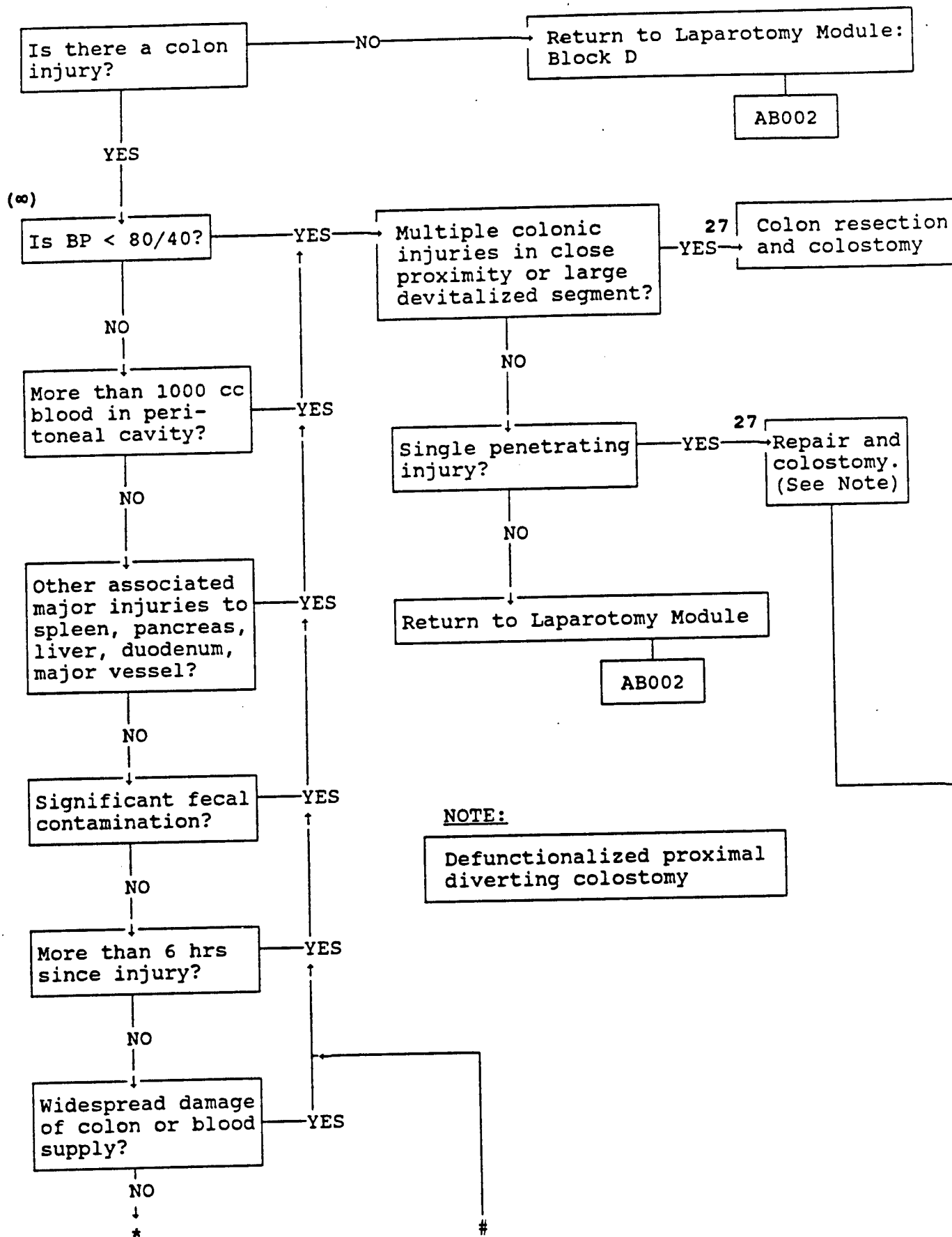


# BLADDER INJURY MODULE

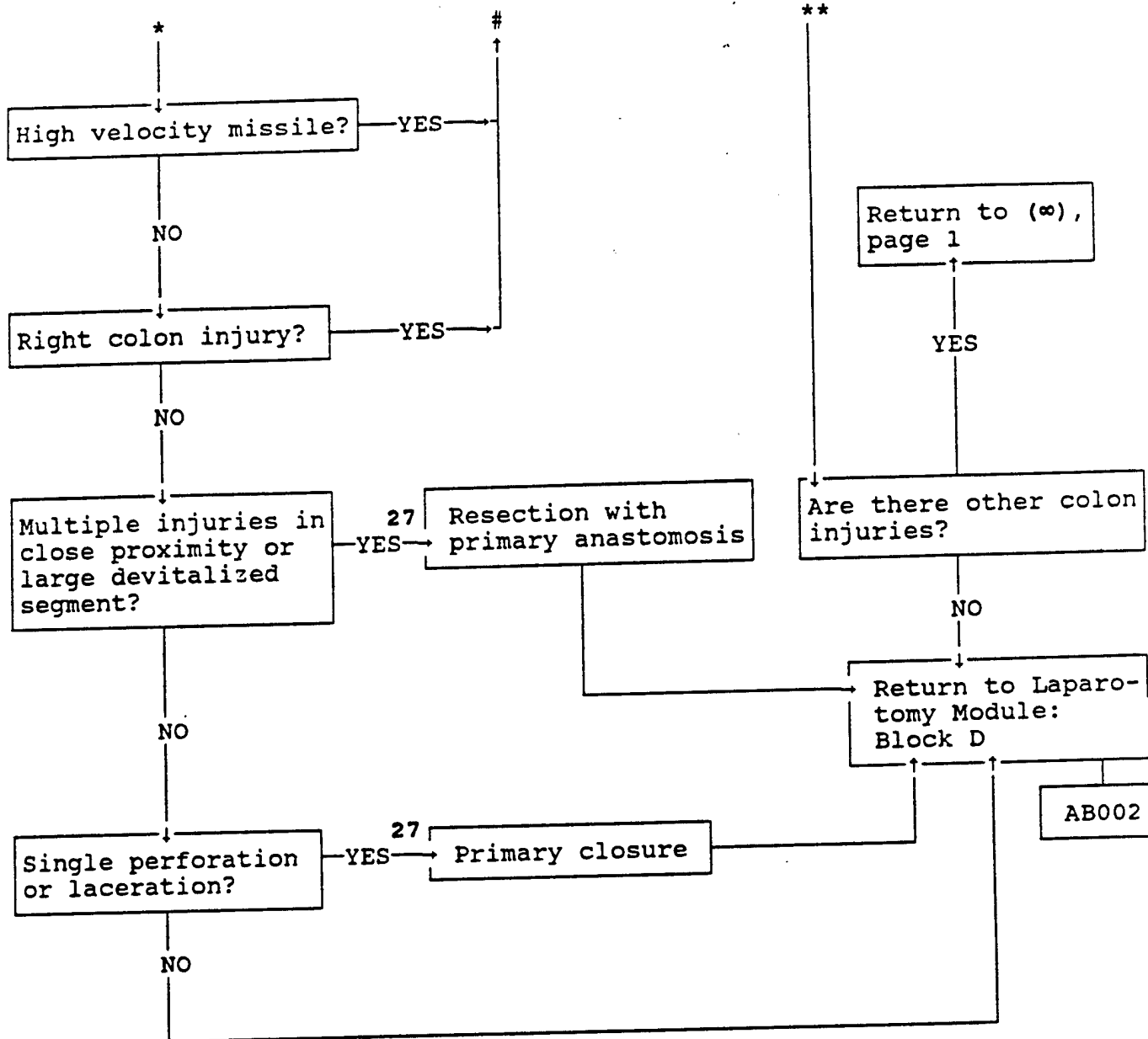
AB004  
1/1



COLON INJURY MODULE

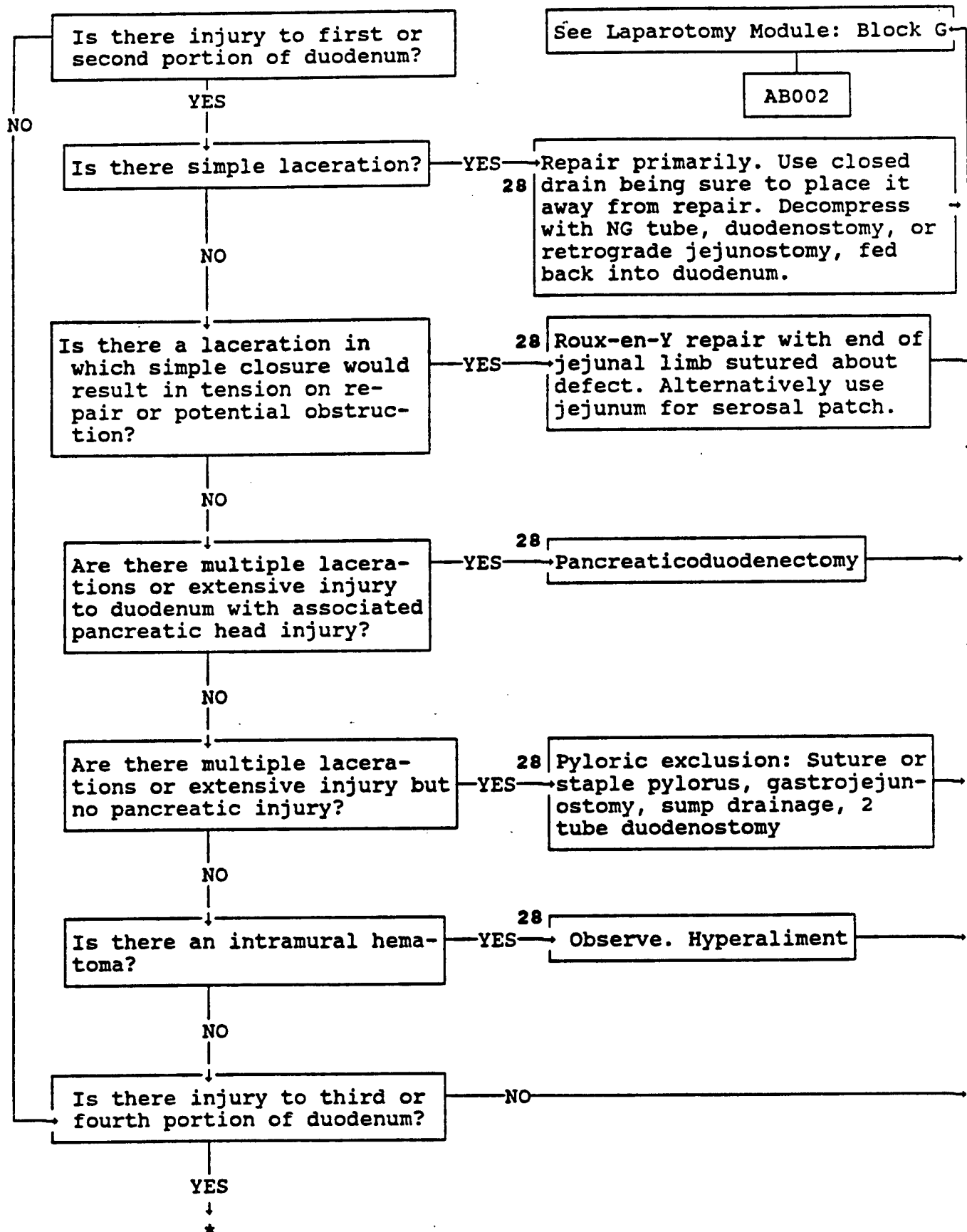


COLON INJURY MODULE



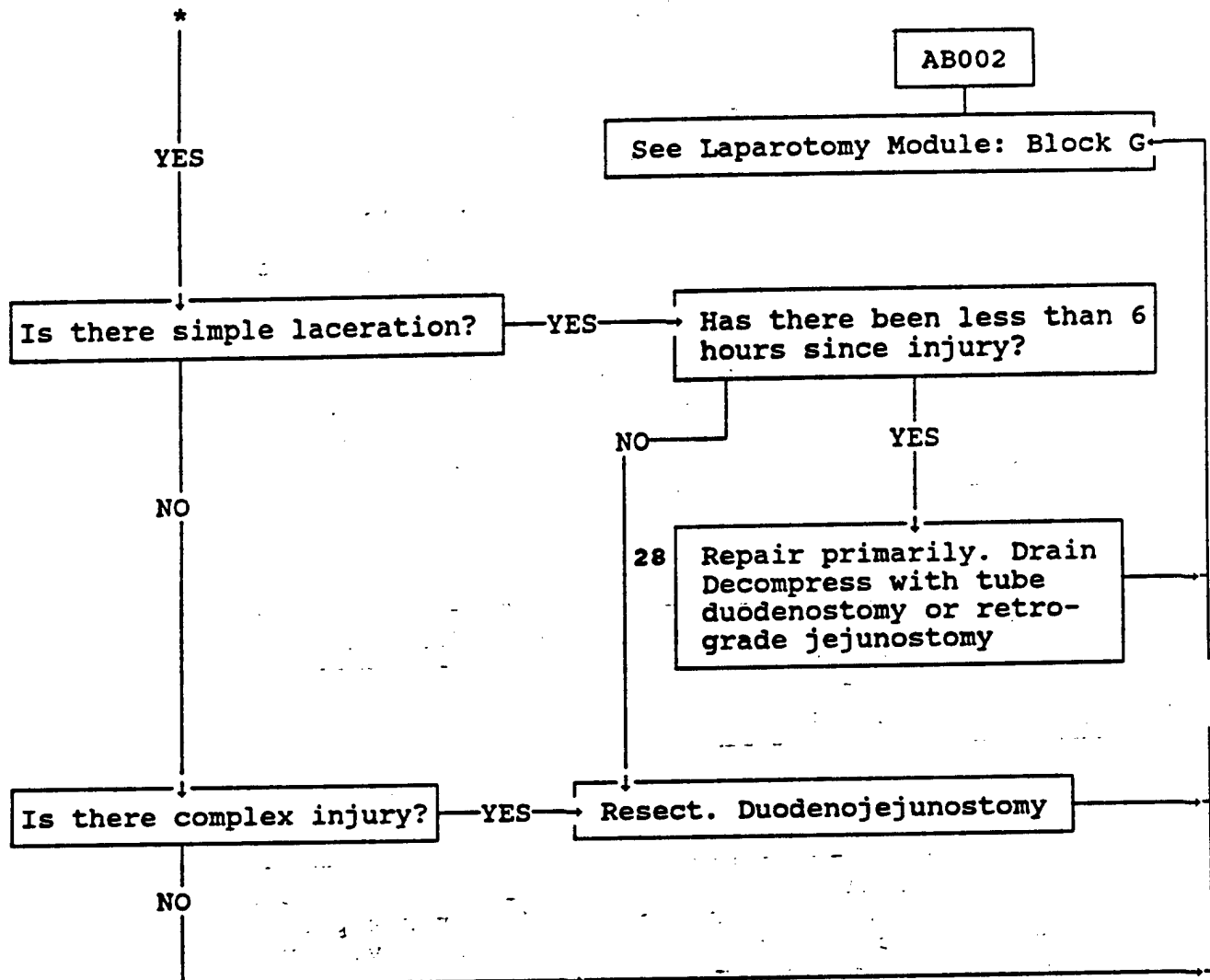
# DUODENUM INJURY MODULE

AB006  
1/2

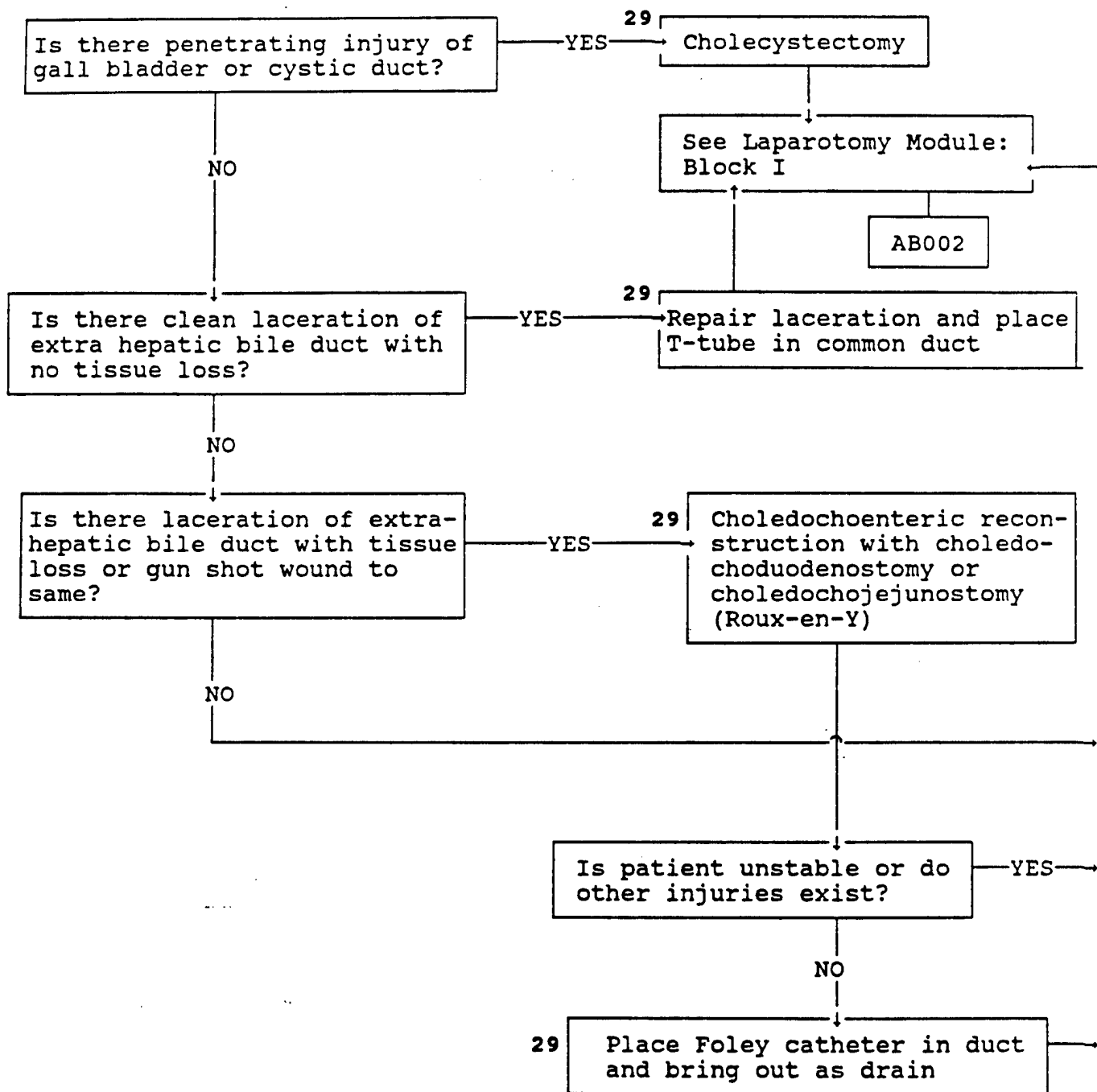




DUODENUM INJURY MODULE

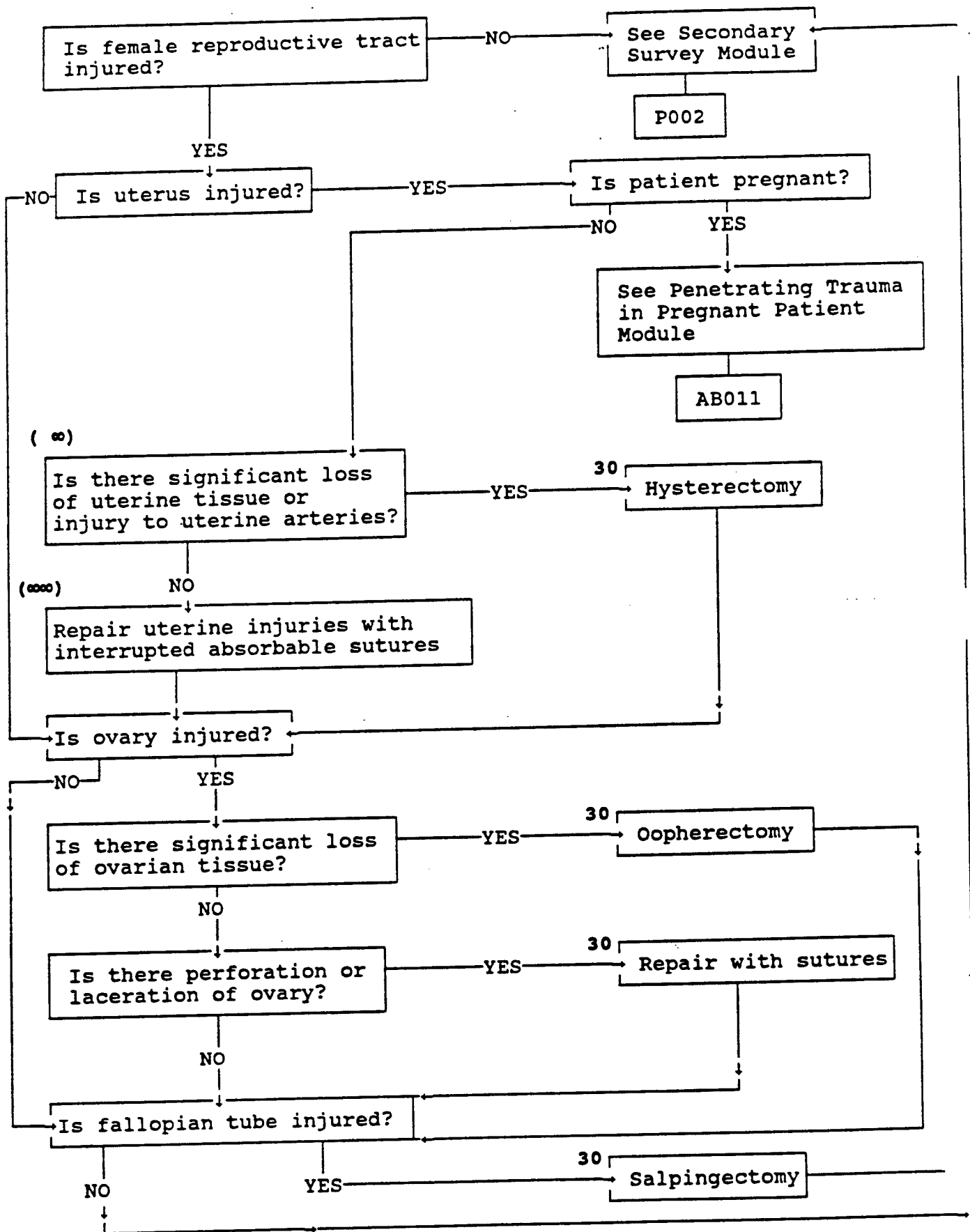


EXTRAHEPATIC BILIARY TRACT INJURY MODULE

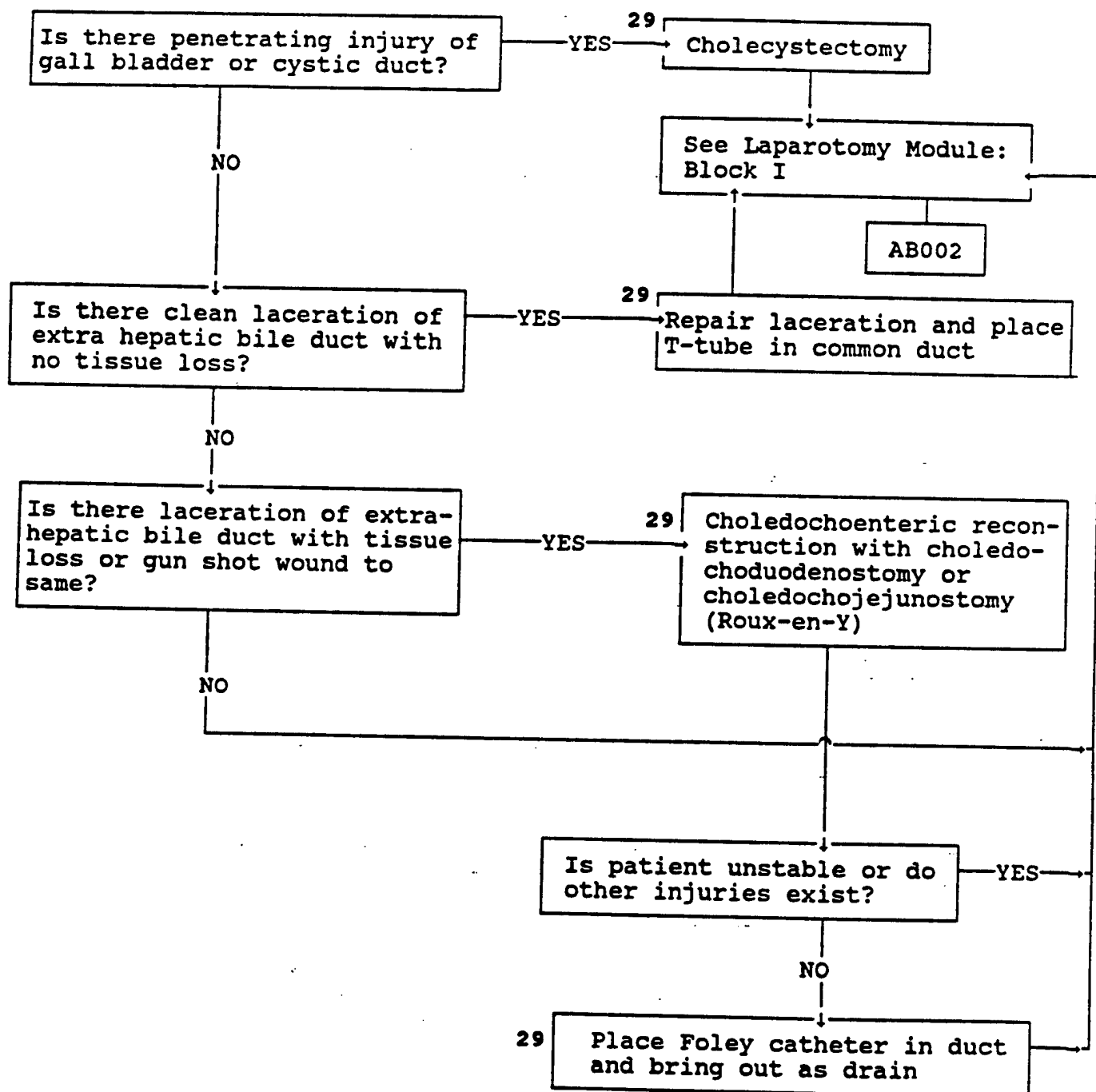


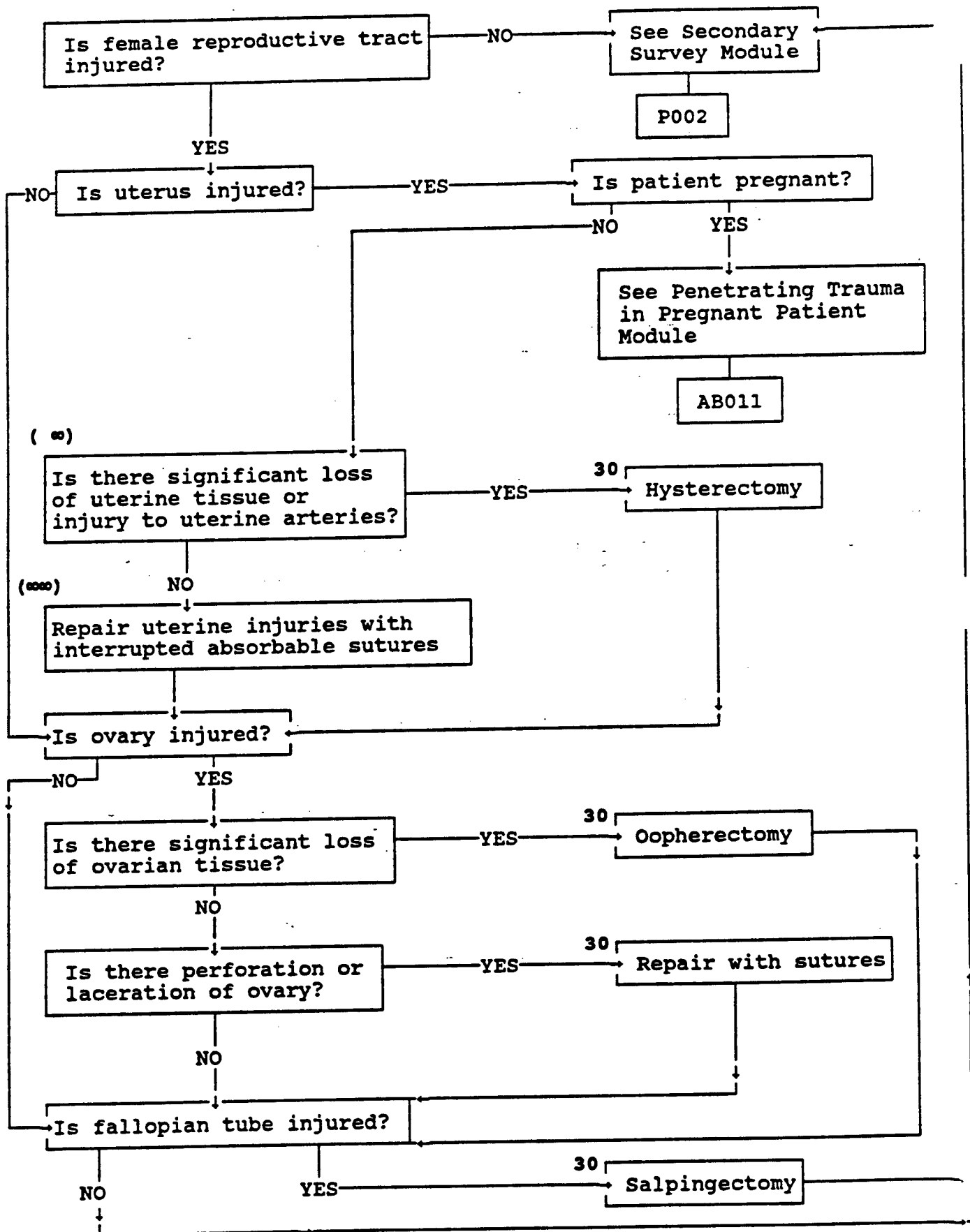
# FEMALE REPRODUCTIVE TRACT INJURY MODULE

AB008  
1/1



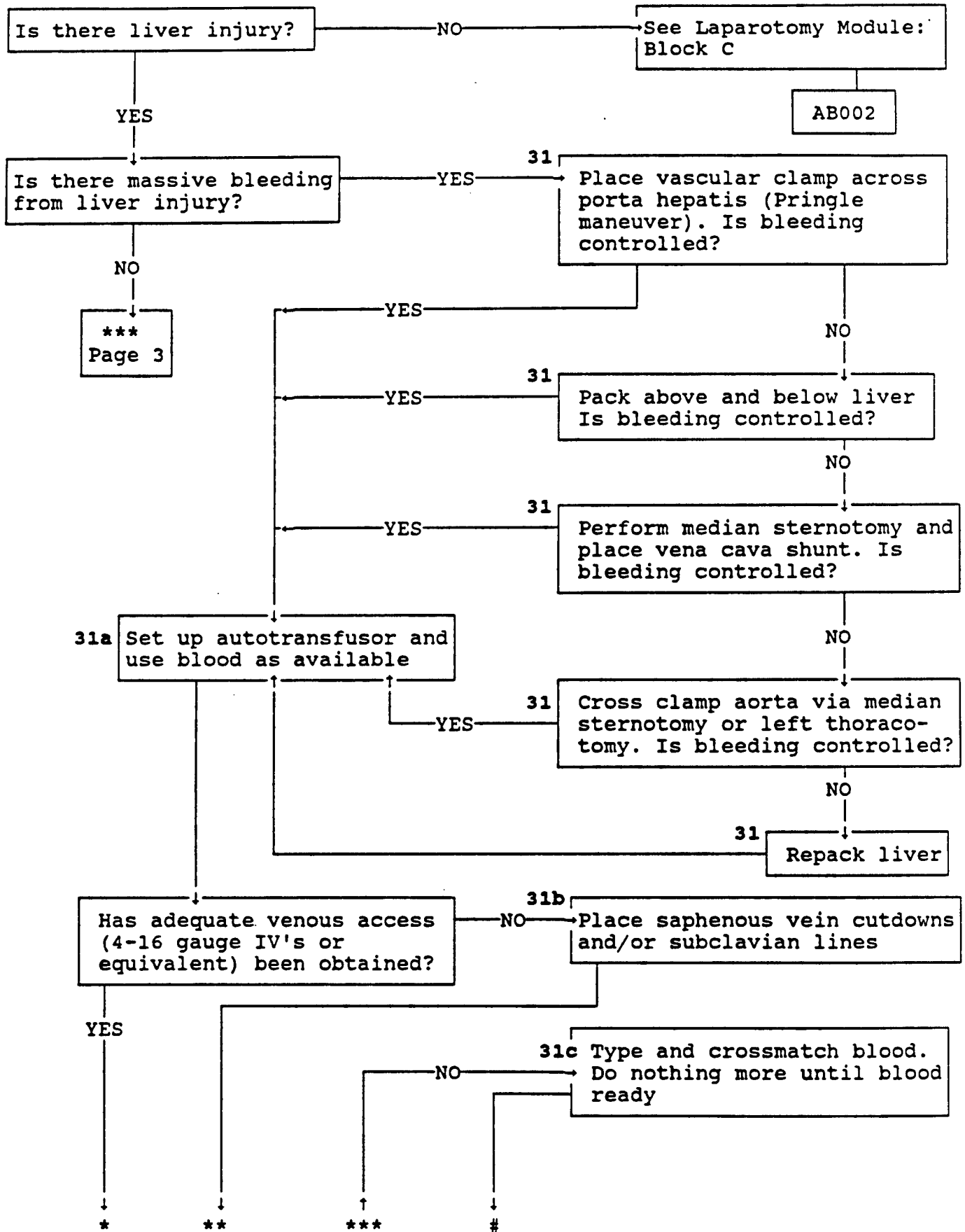
EXTRAHEPATIC BILIARY TRACT INJURY MODULE



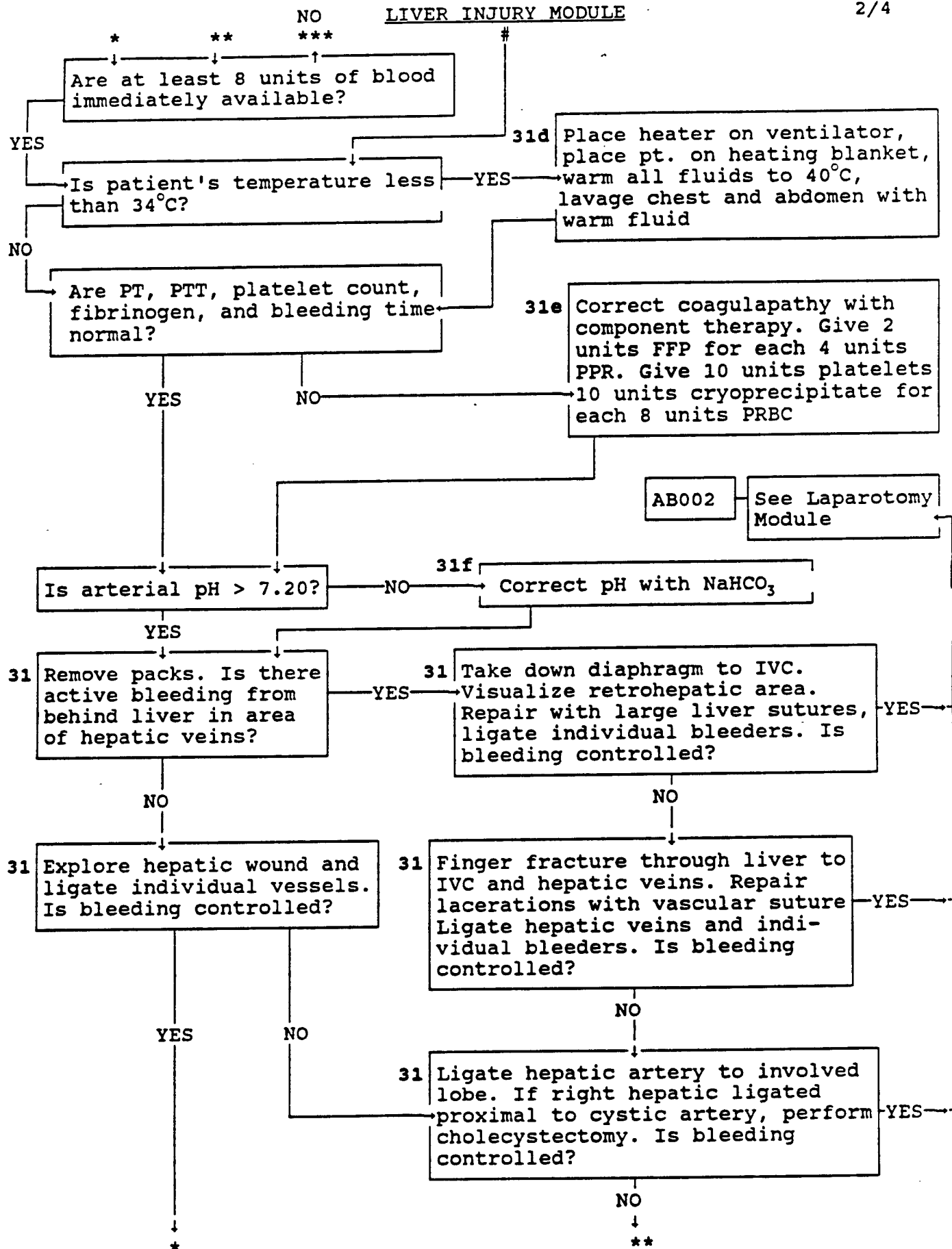


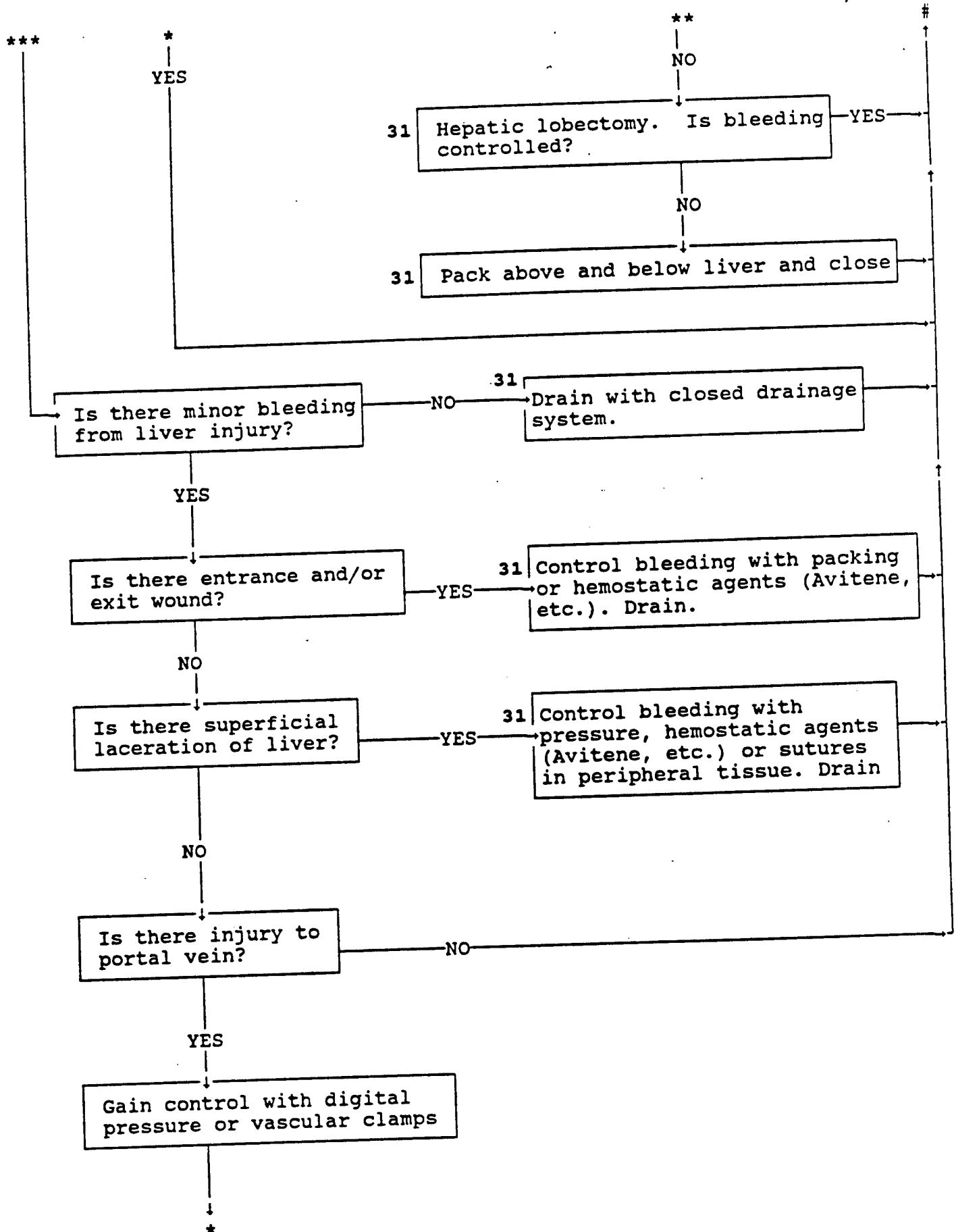
# LIVER INJURY MODULE

AB009  
1/4

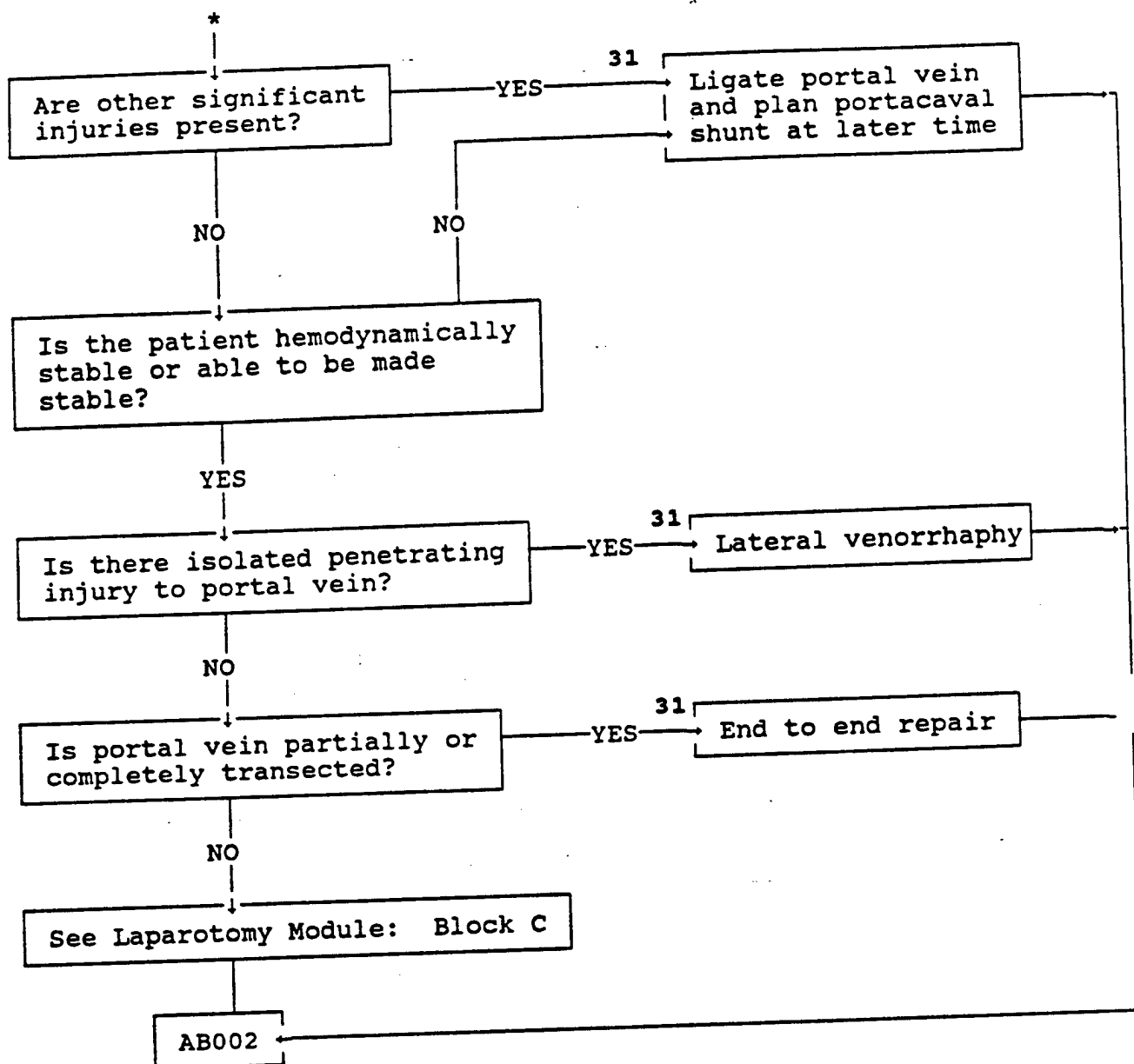


## LIVER INJURY MODULE

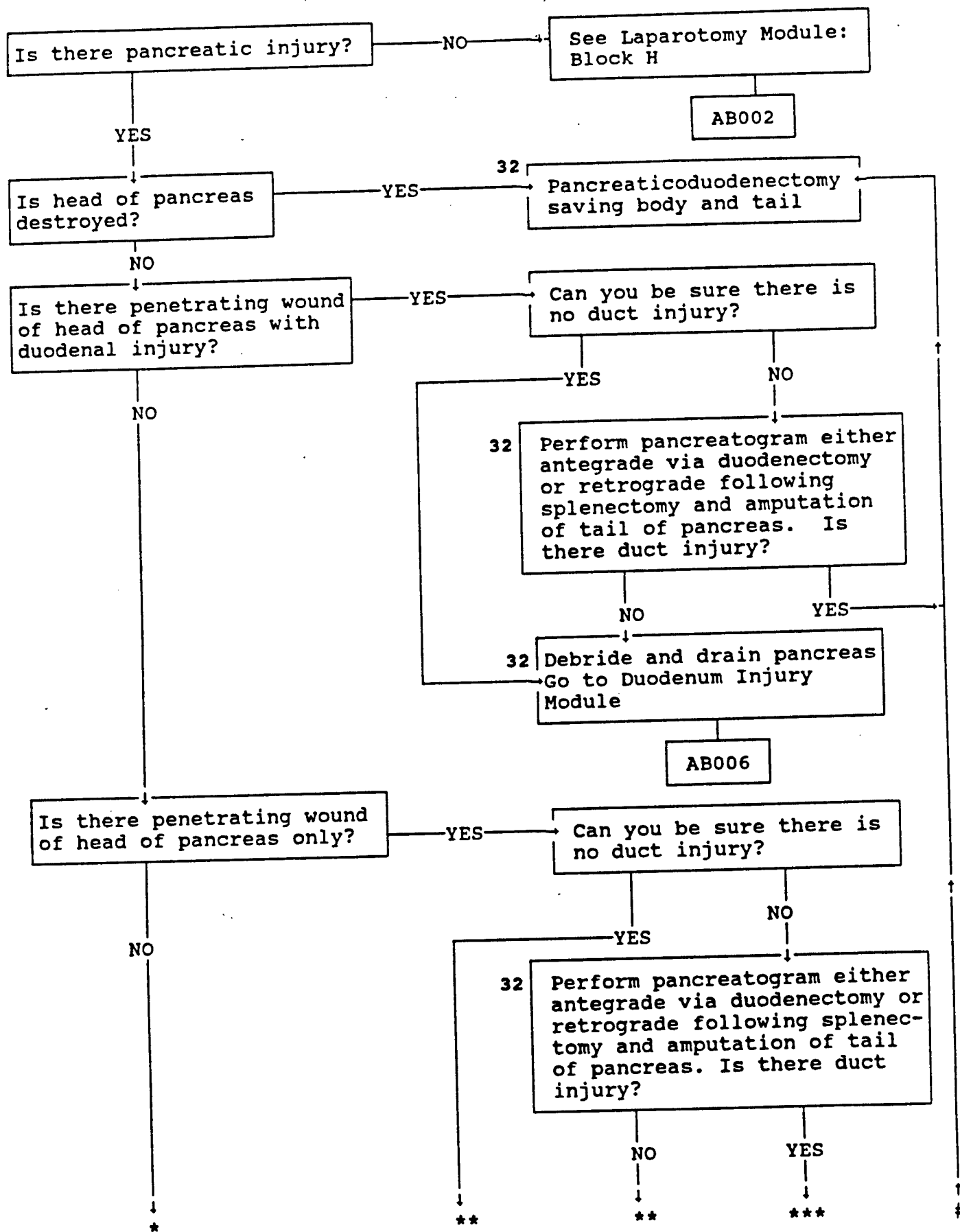




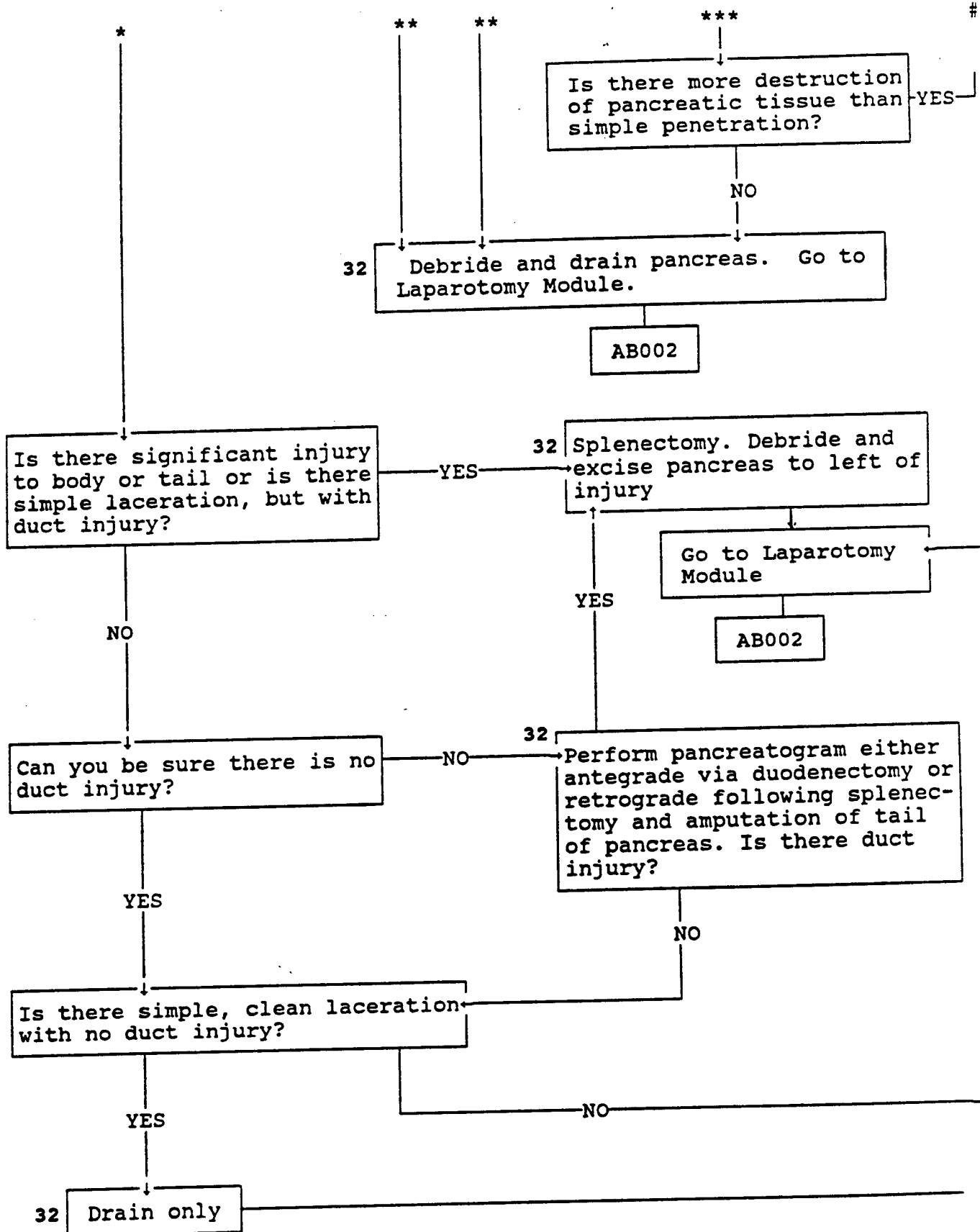




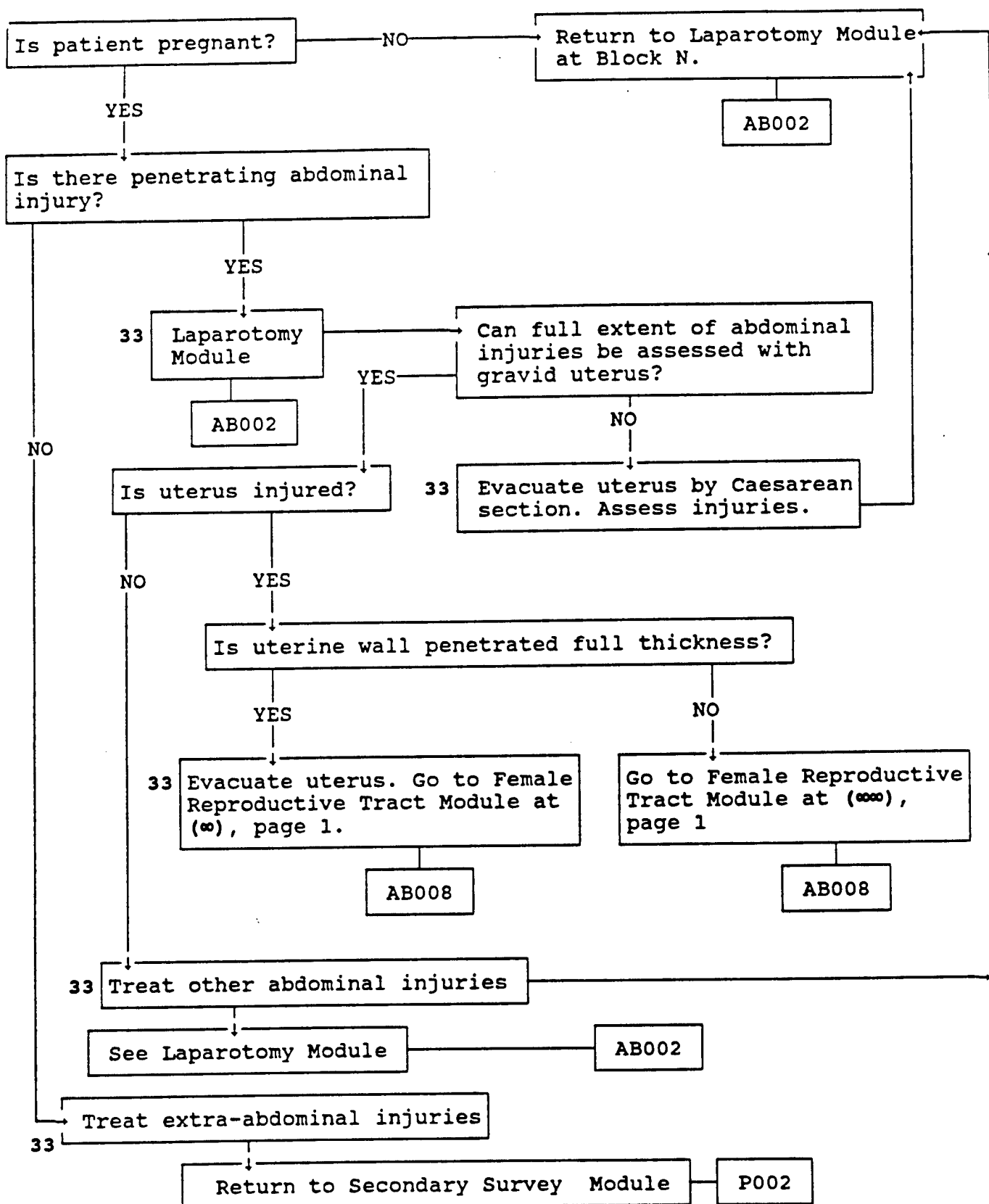
PANCREAS INJURY MODULE



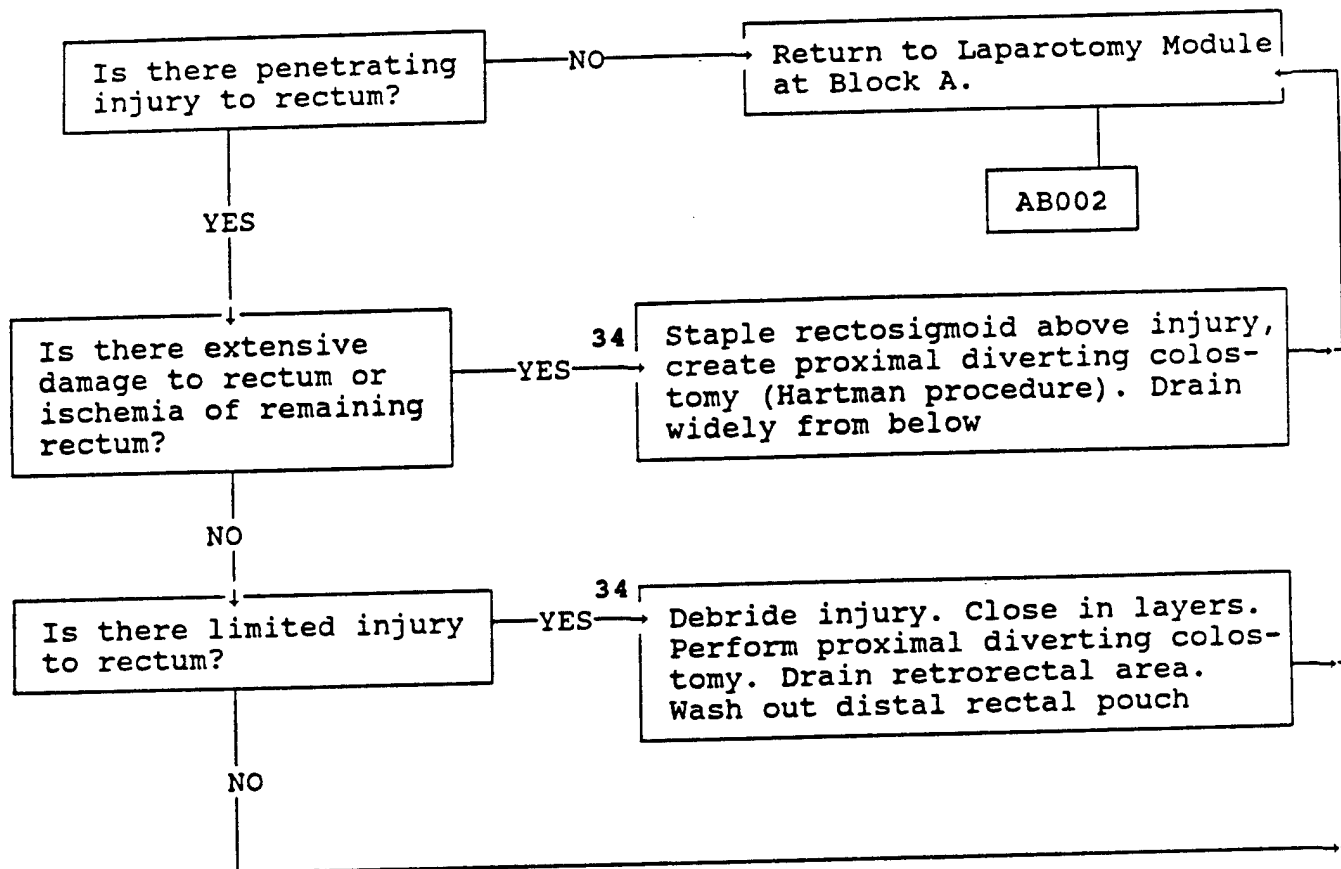
# PANCREAS INJURY MODULE

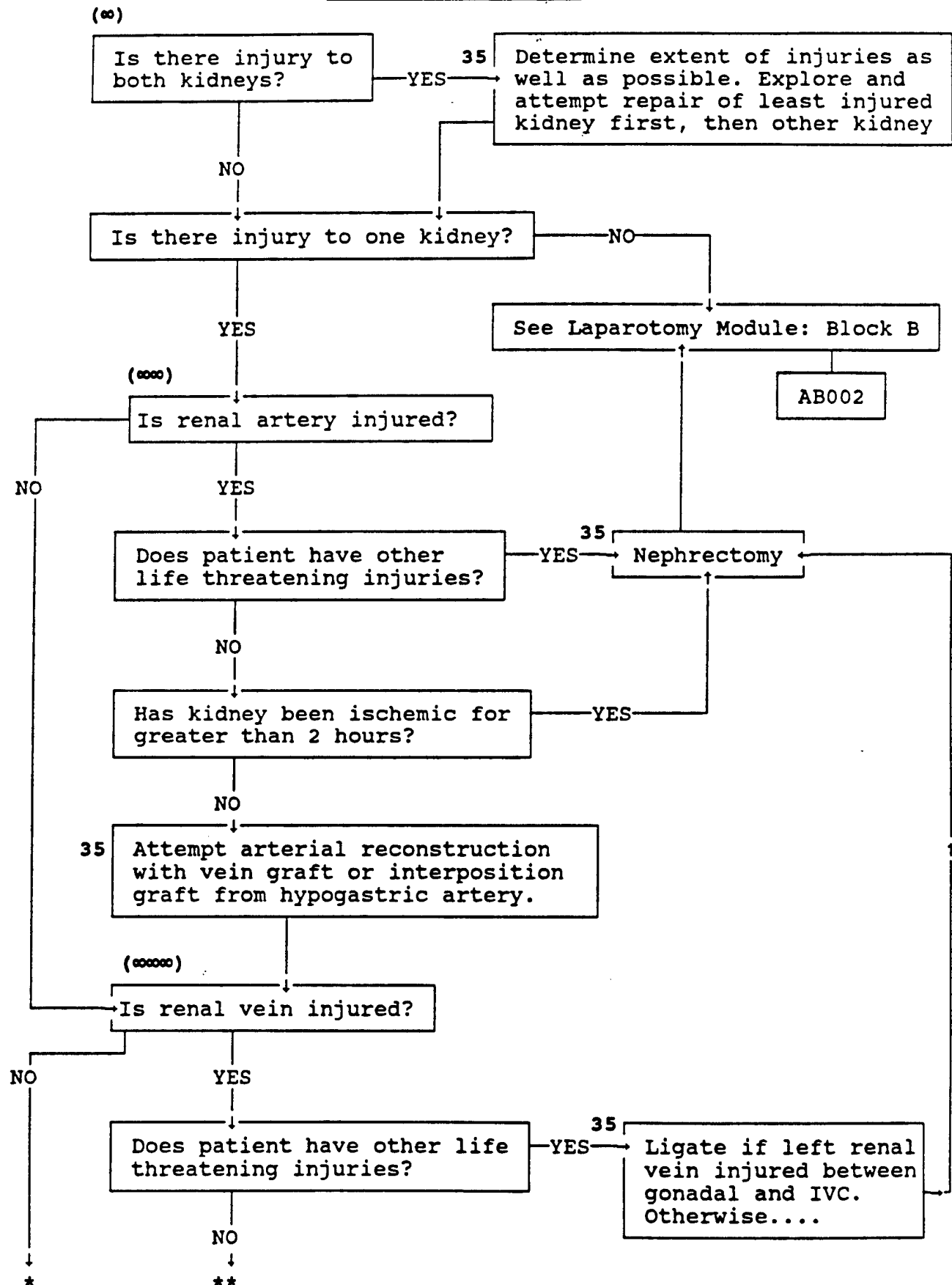


PENETRATING TRAUMA IN PREGNANT PATIENT MODULE

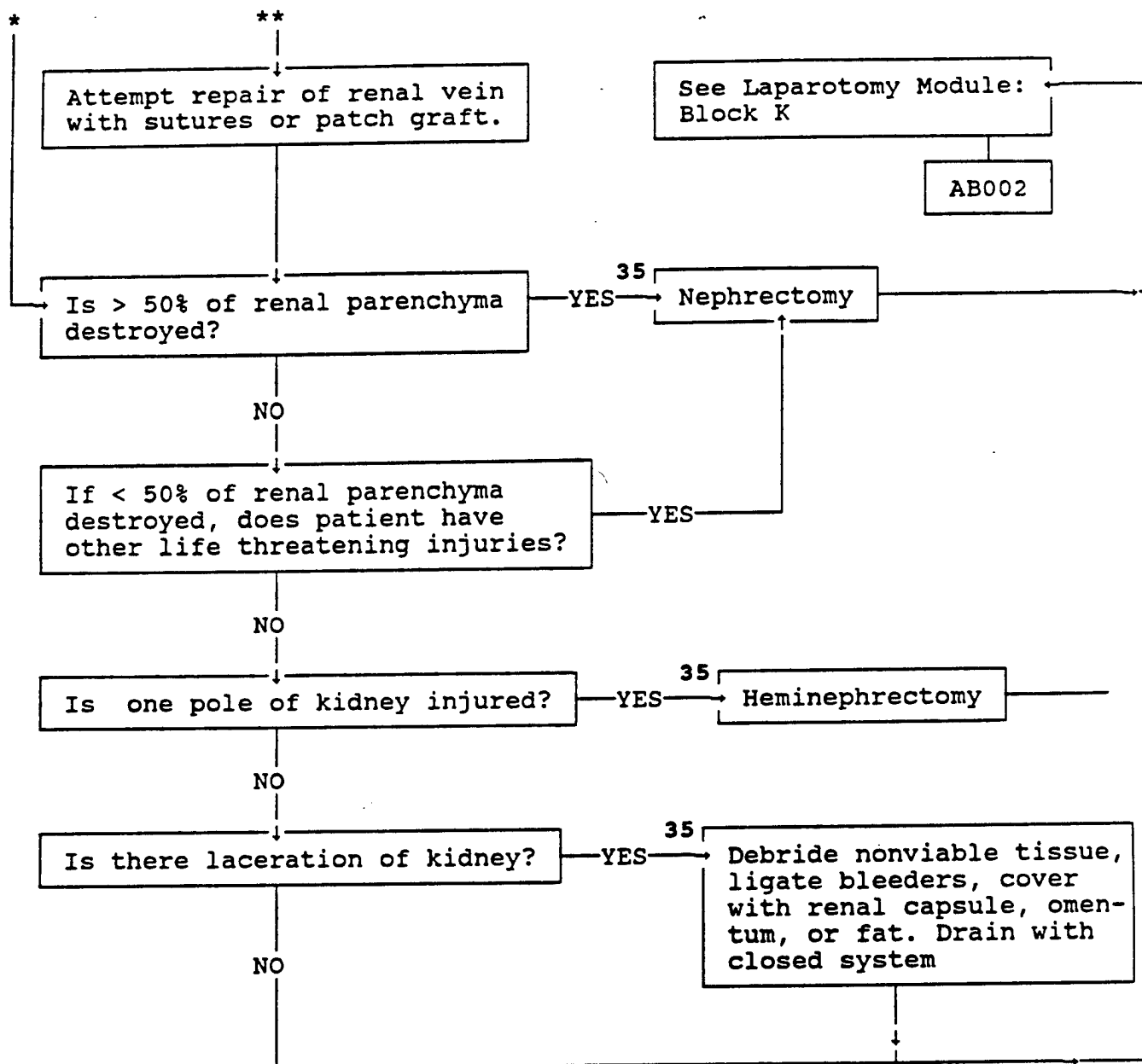


RECTUM INJURY MODULE

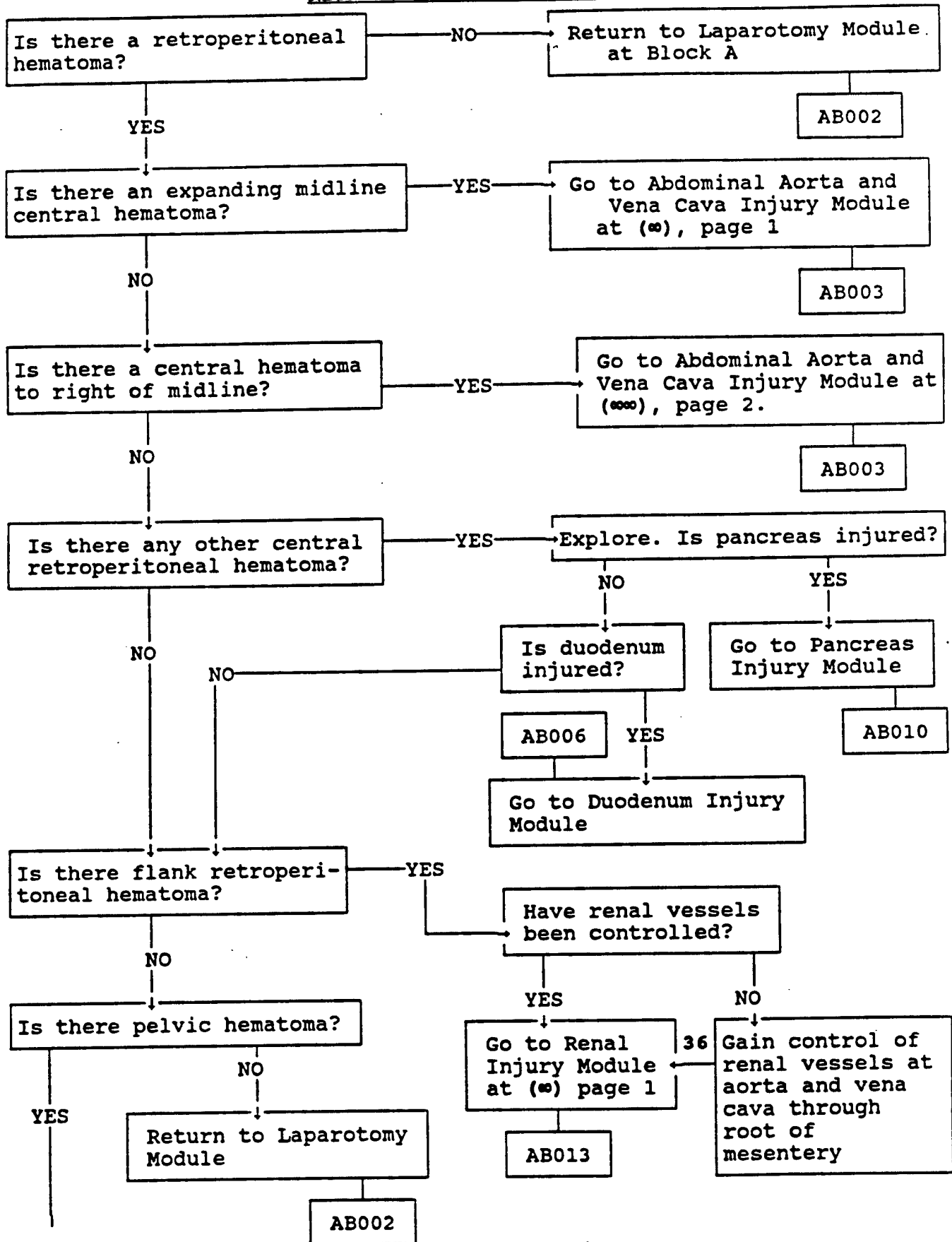


RENAL INJURY MODULE

# RENAL INJURY MODULE



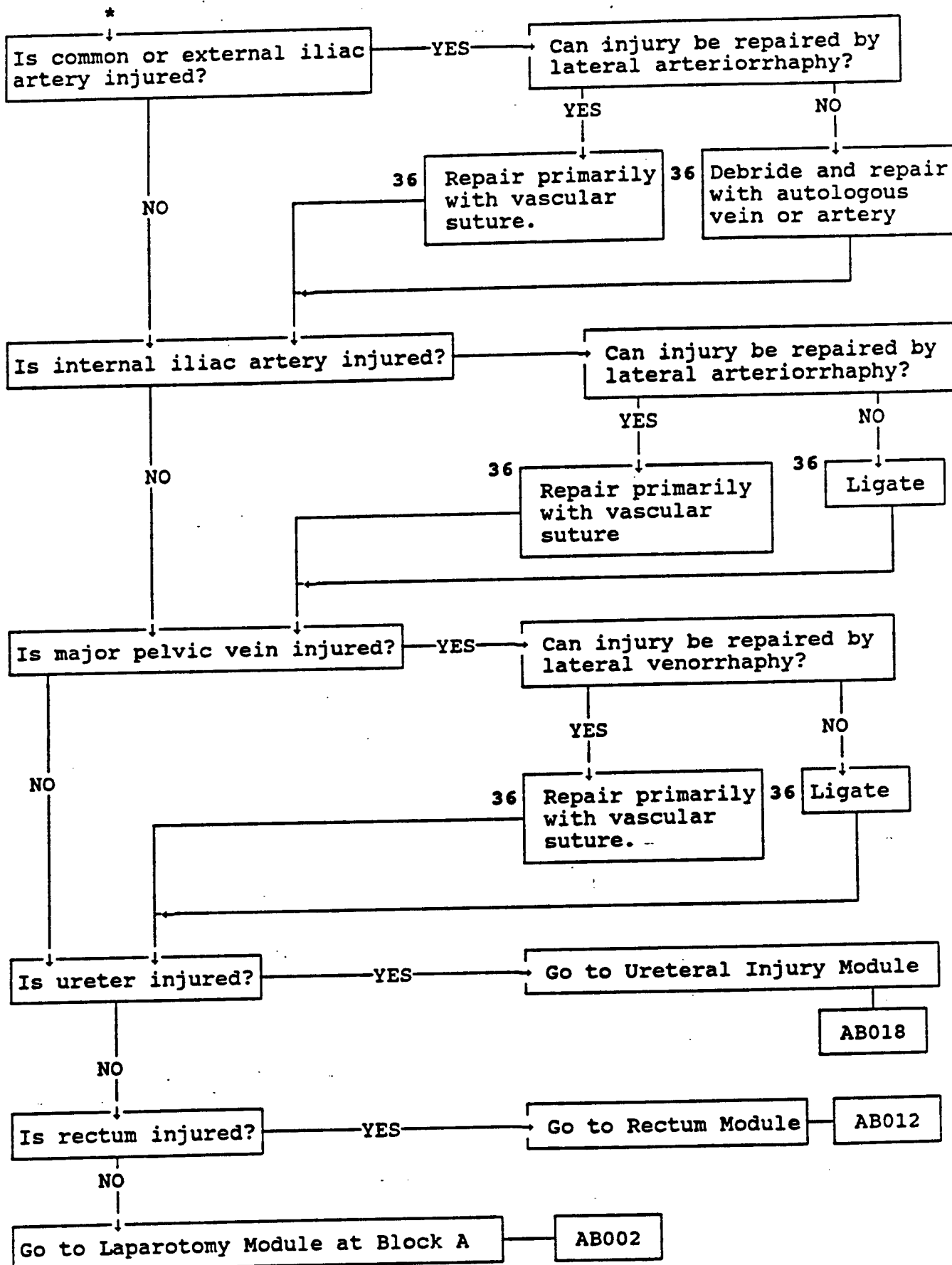
RETROPERITONEAL HEMATOMA MODULE





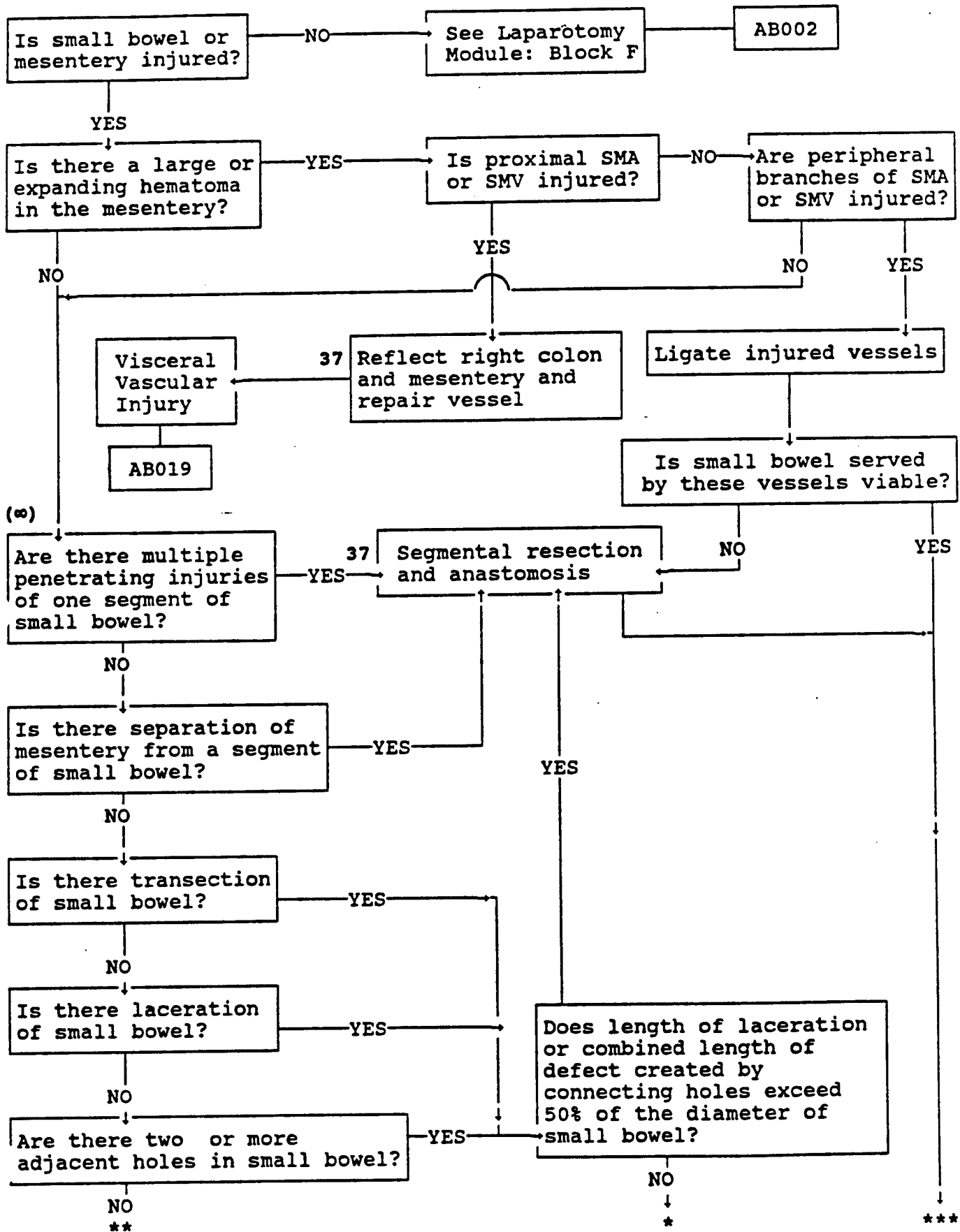
# RETROPERITONEAL HEMATOMA MODULE

AB014  
2/2

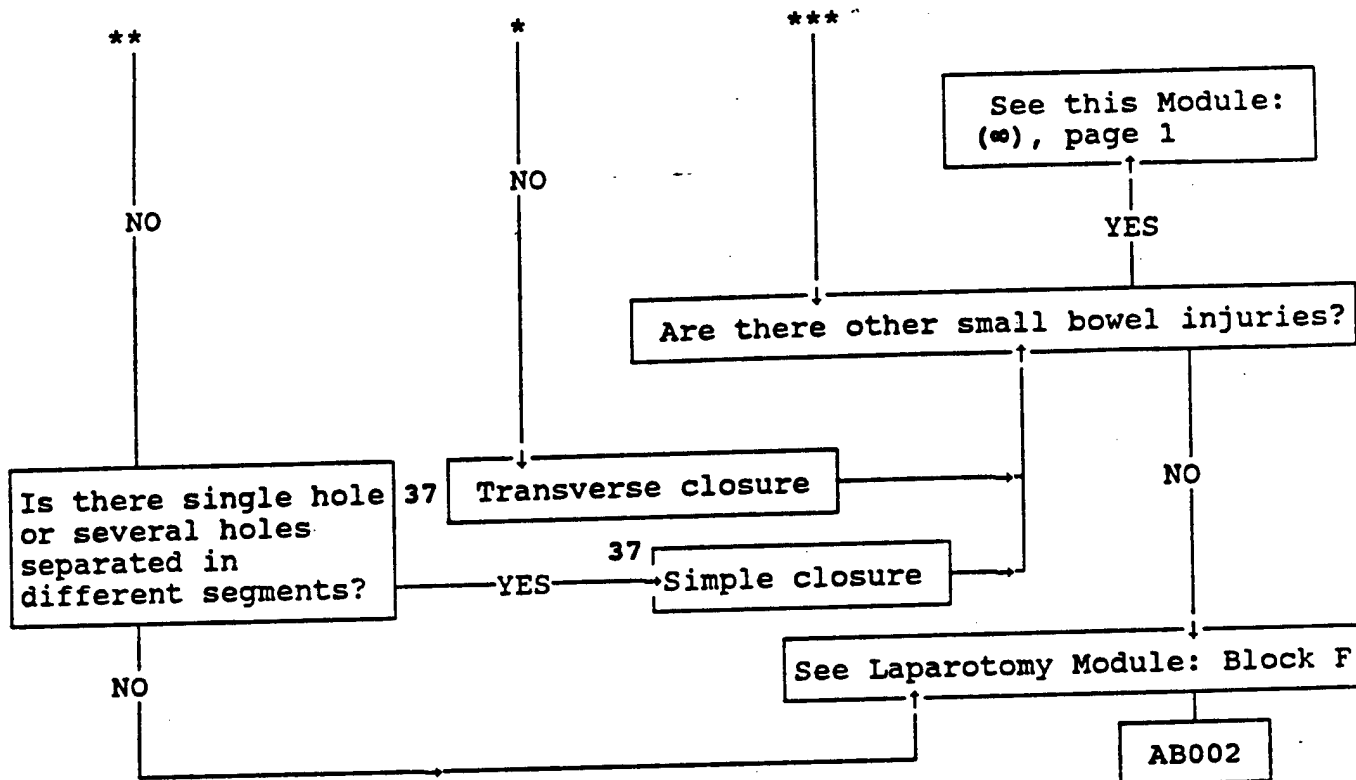


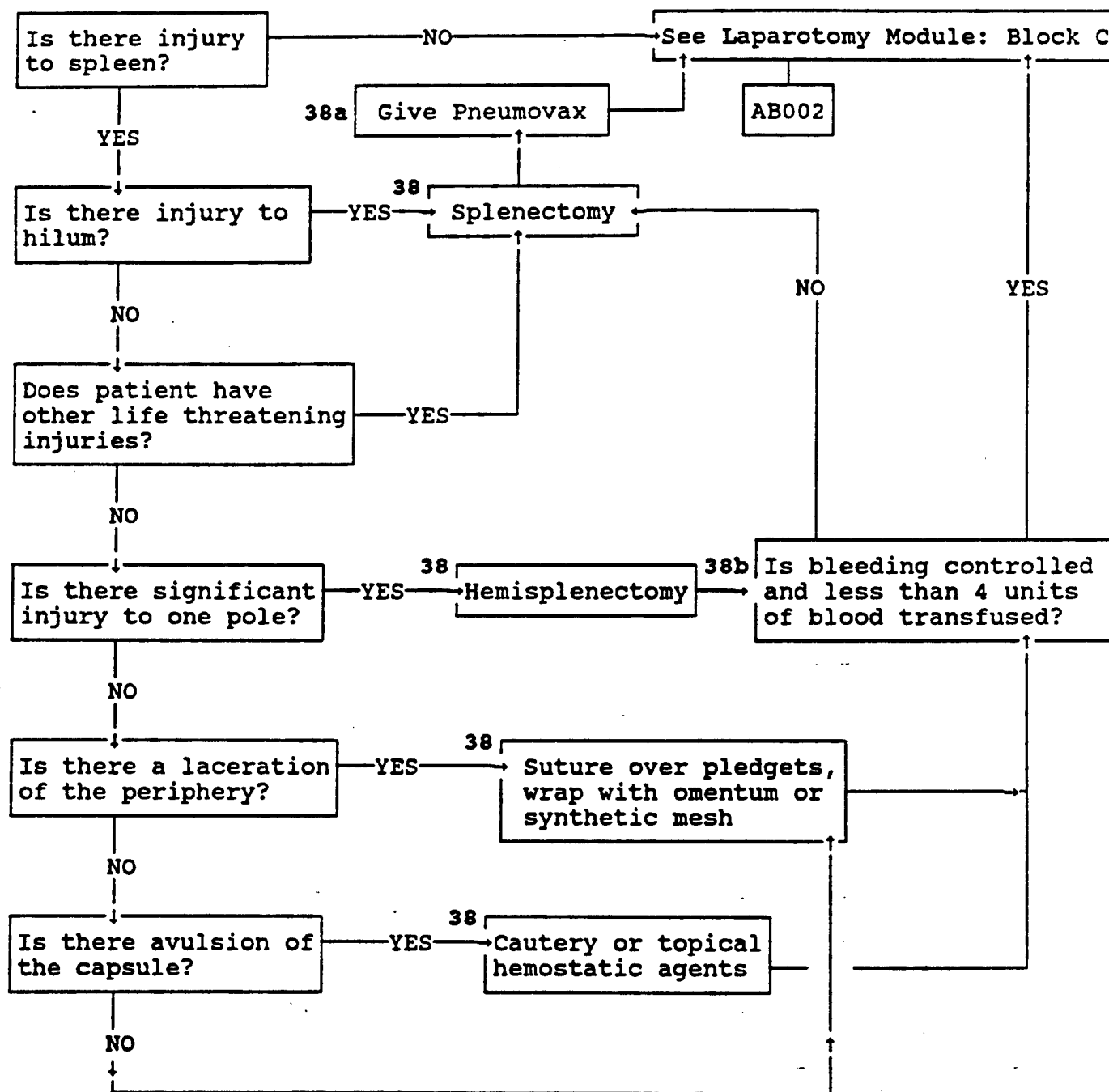
# SMALL BOWEL AND MESENTERY INJURY MODULE

AB015  
1/2

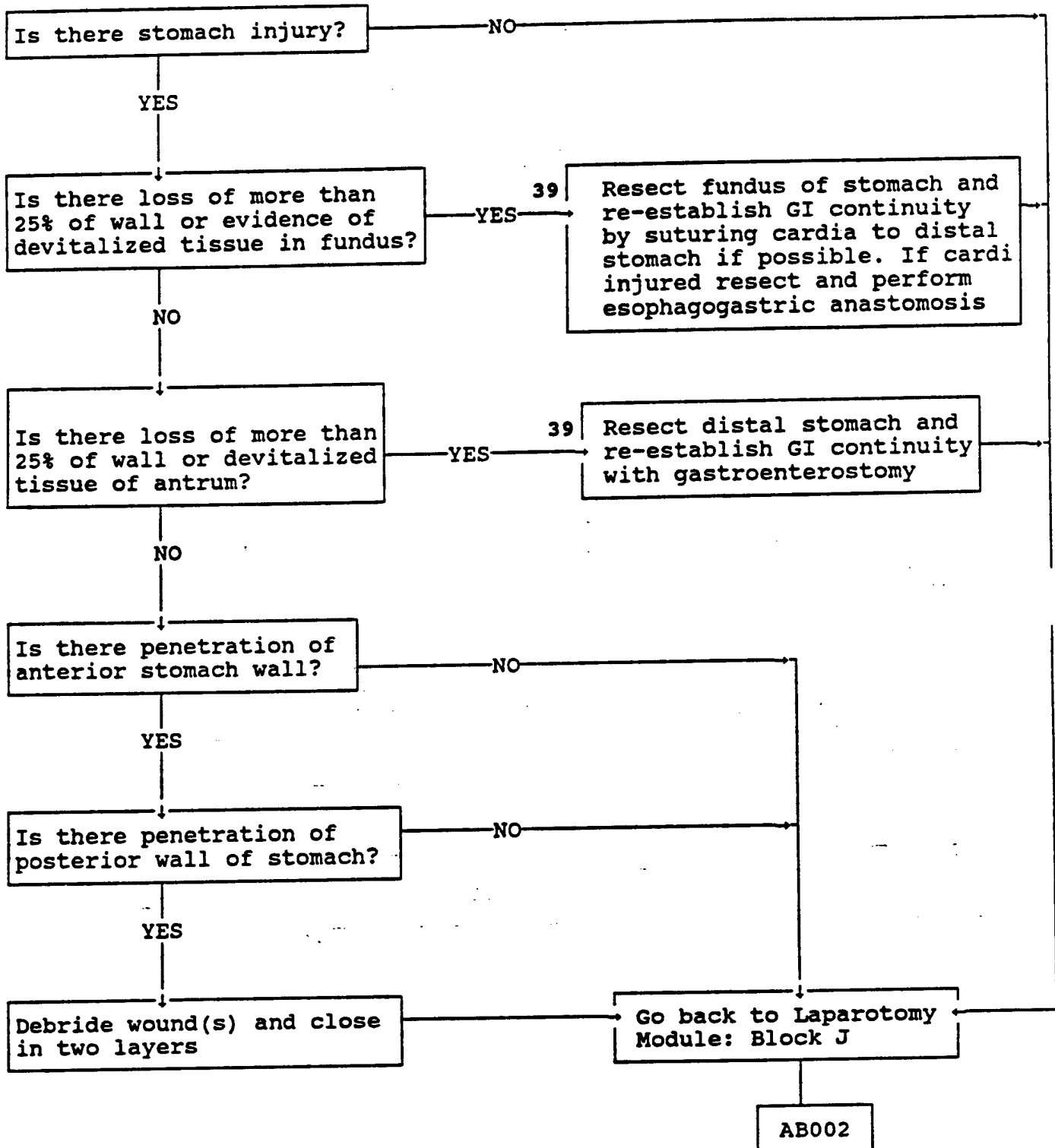


# SMALL BOWEL AND MESENTERY INJURY MODULE

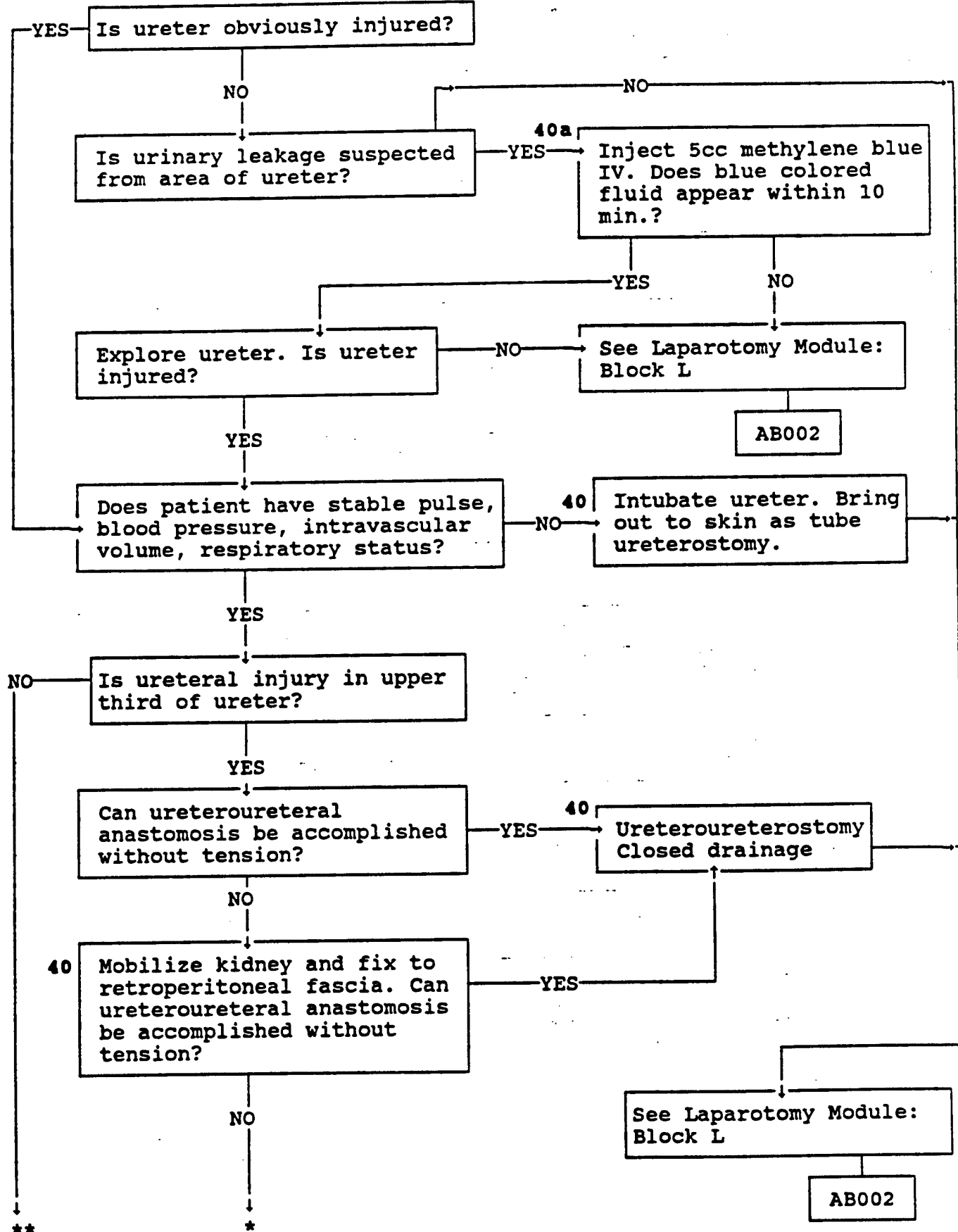


SPLEEN INJURY MODULE

STOMACH INJURY MODULE

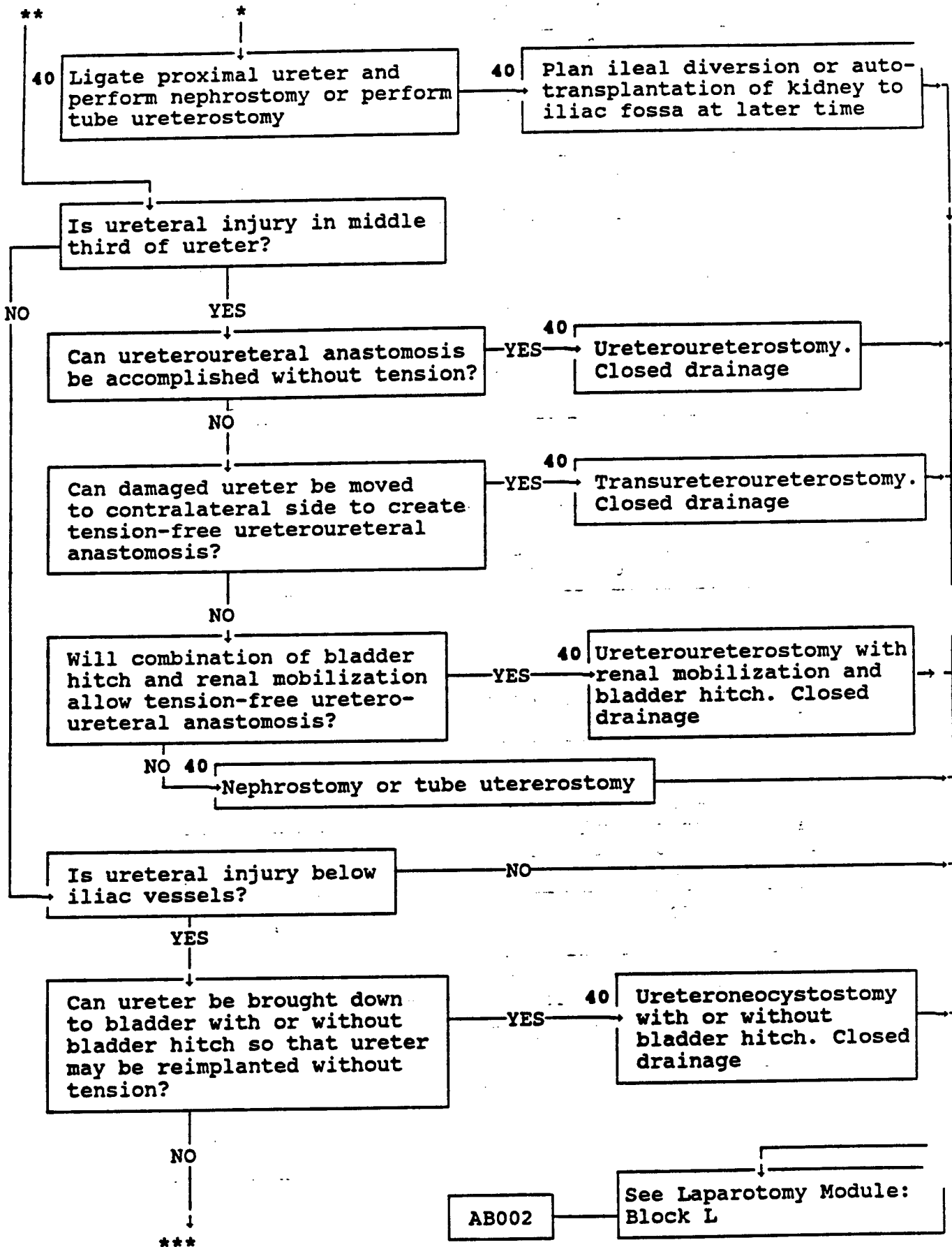


URETERAL INJURY MODULE

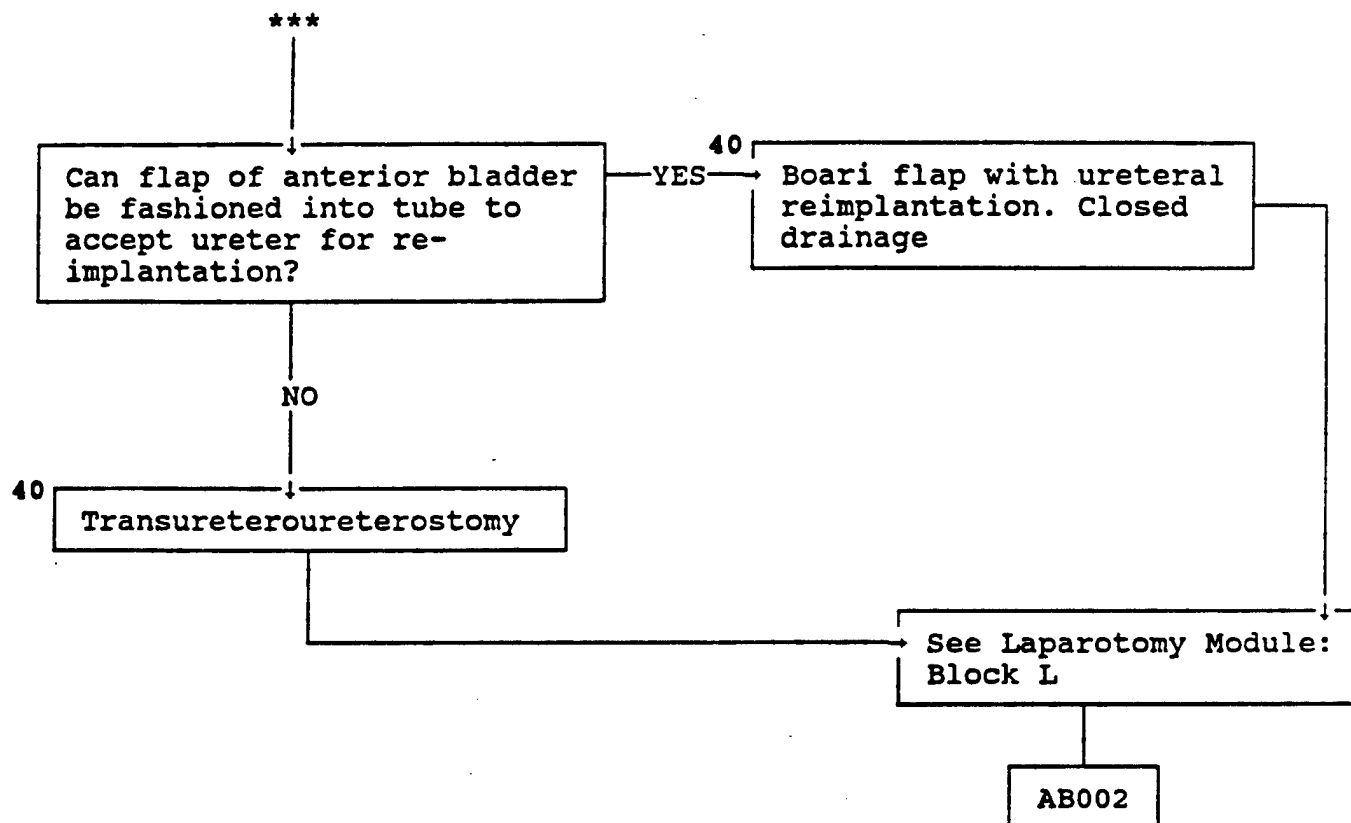


# URETERAL INJURY MODULE

AB018  
2/3



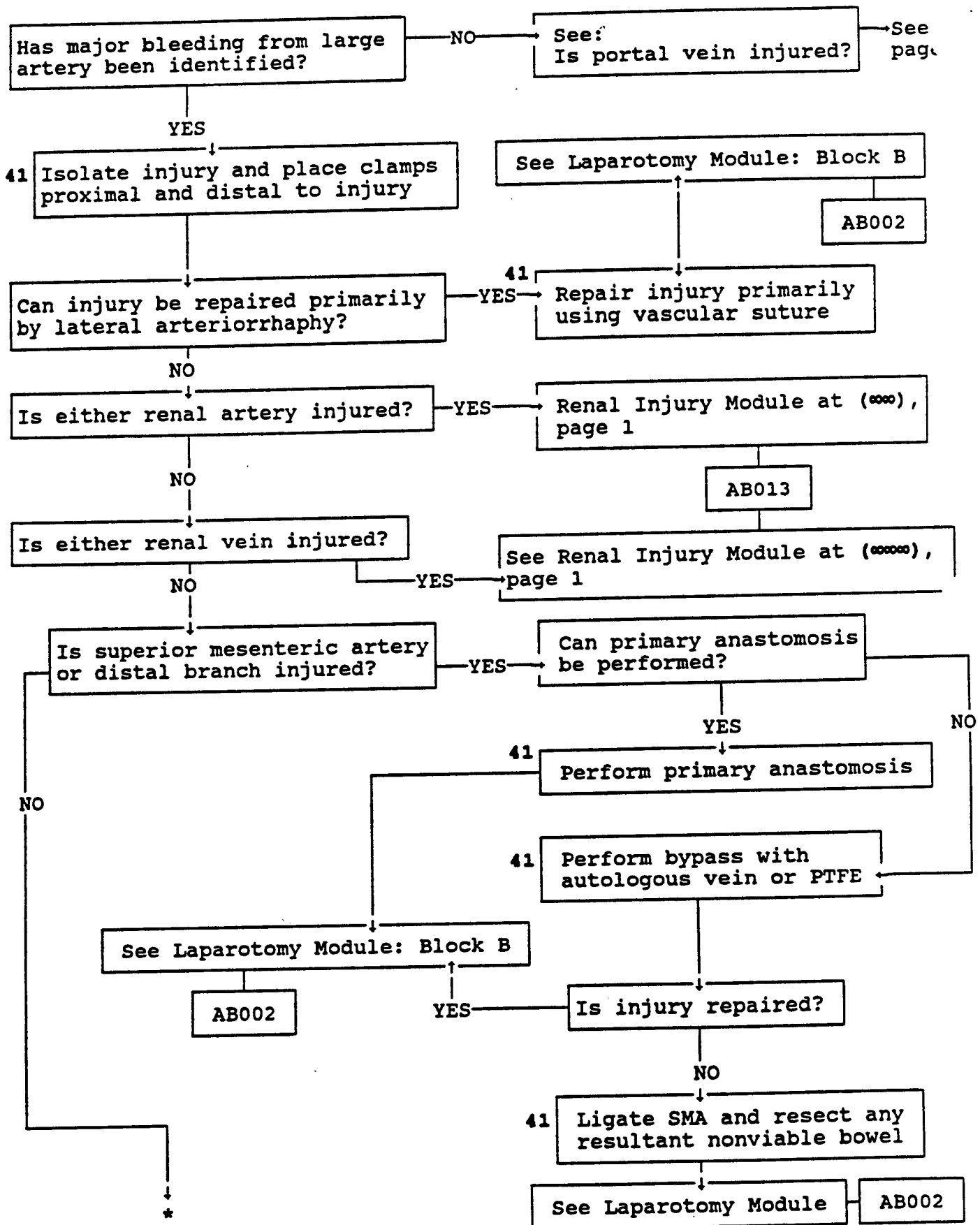
URETERAL INJURY MODULE

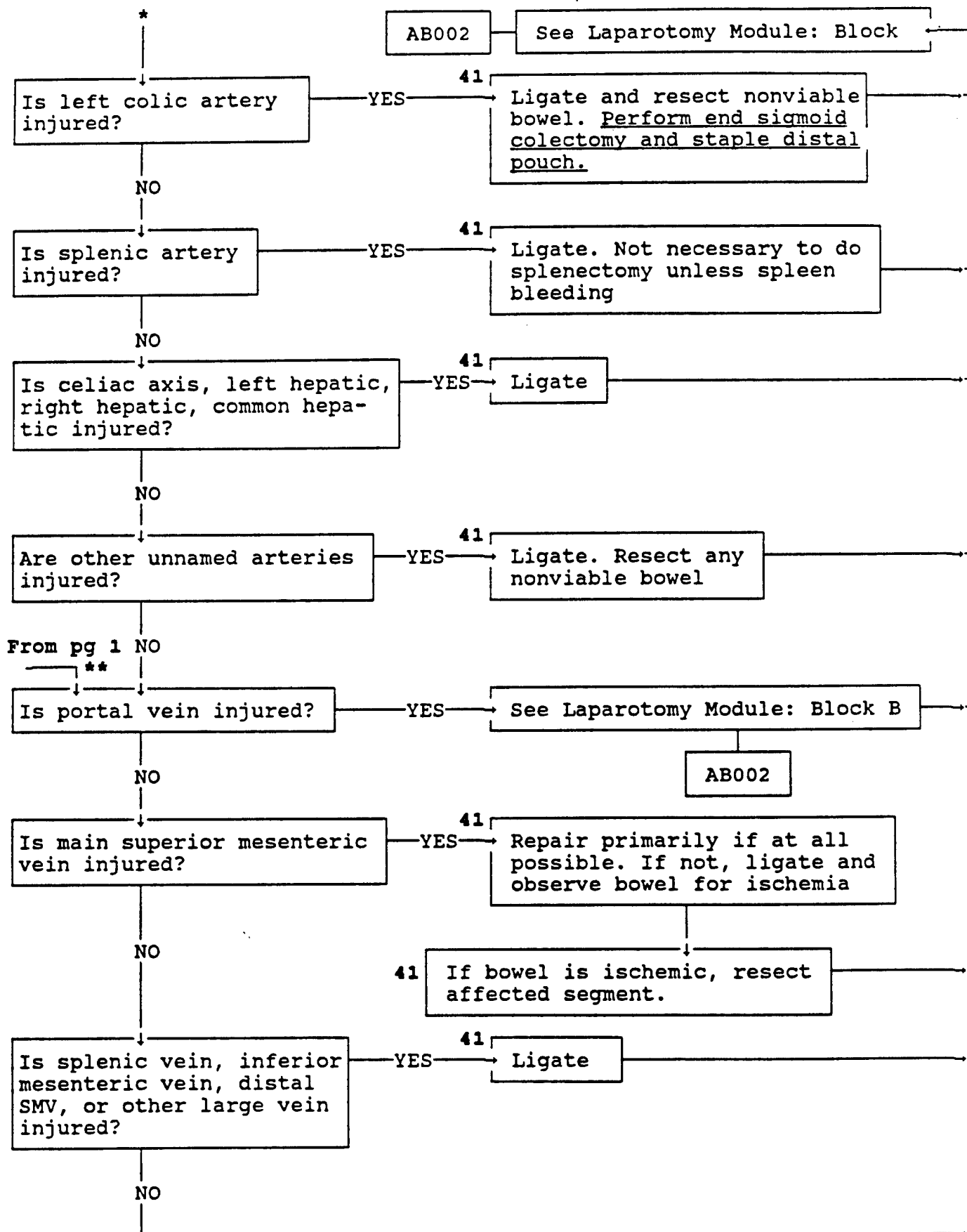




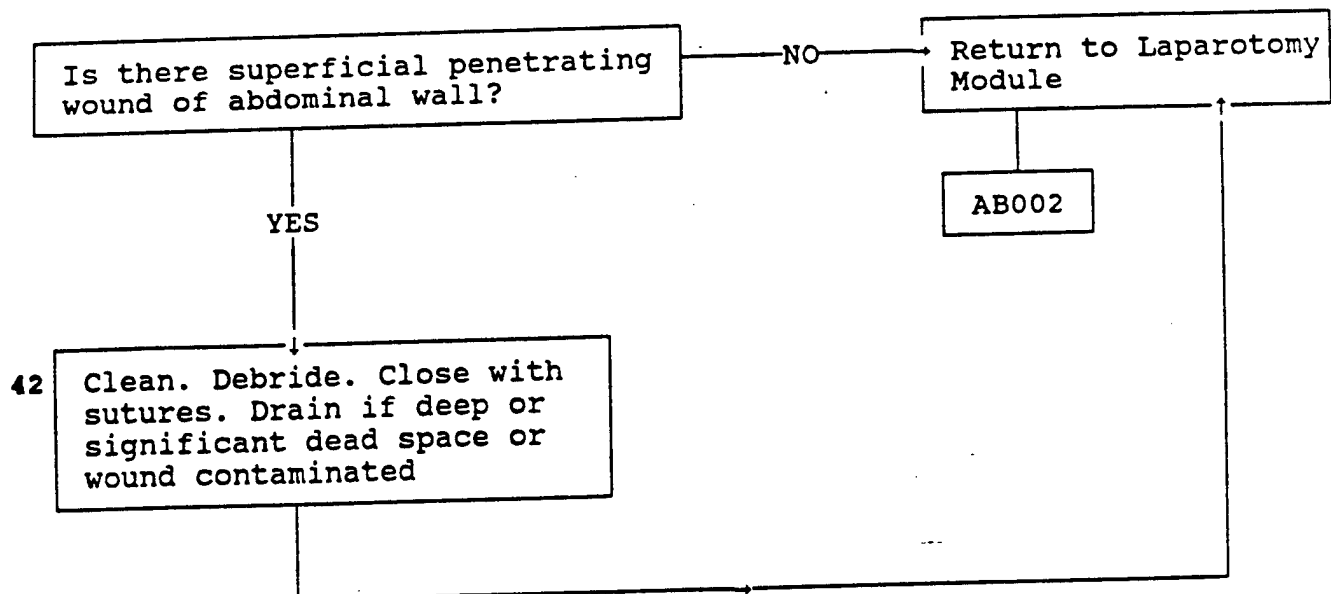
# VISCERAL VASCULAR INJURIES MODULE

AB019  
1/2





SUPERFICIAL INJURY MODULE



Piss when you can.  
[Attributed to the Duke of Wellington,  
When asked by a young subaltern for some  
piece of permanent military wisdom]

#### A. Overview

This section deals with the treatment of traumatic injuries to both male and female eternal genitalia.

#### B. Operation Desert Storm Case Reports

[ The authors are in the process of compiling case scenarios drawn from Desert Storm experience. We would greatly appreciate your help in this task. All case reports will acknowledge the surgeon who reported the case (given that the surgeon would like this information printed).

The report should be (roughly) in the following format:

1. Patient identifying information.  
A 24 yo B Marine corporal . . .
2. Combat situation. True "war stories" are encouraged.  
. . . was involve in an amphibious assault exercise on friendly shores in Saudi Arabia when an M-16 accidentally fired . . .
3. Injury description.  
Striking him in the L groin region . . .
4. Presentation to the hospital ship/field hospital.  
He was immediately evacuated by SH-3 helicopter to the hospital ship USS Mercy. Initial vital signs were . . . he was sent to the OR approximately 45 minutes after the initial injury.
5. Describe OR procedures used. Where possible, refer to appropriate algorithm. Be sure to point out why deviation from the algorithm (if any) occurred. Be sure to point out

limitations due to lack of equipment, special circumstances, or any other item of interest. Area was quickly prepped . . . scrotal injury with major bleeding obscured the field. The spermatic cord was compressed against the pubic tubercle to control hemorrhage (Node G002, 1/2). . .

6. Post op course.  
Recovery was uneventful. After two days he was transferred via Air Force C-9 to . . .
7. Any other "pearls" or difficulties you'd like to discuss.
8. Your name, unit, overseas address, permanent address and phone number (not required).  
  
CAPT Joe Jones (USN(R), General Surgeon assigned to U.S.S. Mercy, FPO . . ., 111 Main St, Topeka, KS 50000. (555)222-1212.
9. Be sure that all information sent is unclassified and does not disclose information that might be harmful to the forces presently involved.

We understand the circumstances under which many of you are operating. Ideally, submit on word perfect disc. Typewritten next best option. Scribbled on the back of a piece of MRE wrapping--just fine. We are looking for common cases as well as the more esoteric.

Mail to:

CDR J.M. Linenger, MC, USN  
Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-6896  
(619) 553-6890 (FAX)

We feel that these case scenarios will be useful to future combat surgeons with less experience than your own, and we greatly appreciate your contributions. Thank you. ]

### C. Decision Trees

# EXTERNAL GENITALIA

Key to specialty codes: A - Surgeon; B - Specialty Surgeon  
C - Anesthesiologist; D - Nurse  
E - Corpsman

Key to care descriptors: 1 - Minimal  
2 - Adequate  
3 - Optimal  
\* - With training

TREATMENT	----- SPECIALTY CODES -----					EQUIPMENT
	A	B	C	D	E	
1. Repair injury to vulva	2*	3				Basic Instrument List; Secondary List
2. Pack or repair vaginal injury	2*	3				Basic Instrument List; Secondary List
3. Place urethral catheter	2*	3				Secondary List
4. Repair urethral injury, stent, place supra-pubic cystostomy	2*	3				Basic Instrument List; Cysto Instrument List; Secondary List
5. Compress spermatic cord against pubic tubercle	2*	3				Basic Instrument List; Secondary List
6. Explore scrotum and control bleeding	2*	3				Basic Instrument List; Secondary List
7. Orchiectomy	2*	3				Basic Instrument List; Secondary List
8. Suture wound	2*	3				Basic Instrument List; Secondary List
9. Place testis in thigh pouch	2*	3				Basic Instrument List; Plastics Instrument List; Secondary List
10. Apply full thickness skin graft	2*	3				Basic Instrument List; Plastics Instrument List; Secondary List
11. Amputate penis and place urethral catheter	2*	3				Basic Instrument List; Secondary List
12. Place urethral catheter, debride necrotic penile tissue, close Buck's fascia and skin	2*	3				Basic Instrument List; Secondary List
13. Suprapubic cystostomy, delayed repair. Debride necrotic penile tissue, close fascia and skin	2*	3				Basic Instrument List; Secondary List
14. Remove fascia sutures, and pack wound	2*	3				Basic Instrument List; Secondary List

## \*\*\*\*\* Explanation of Specialty Codes and Care Descriptors \*\*\*\*\*

In all cases, procedures are optimally performed by a gynecology surgeon for female patients, a genito-urinary surgeon for males, and a urologist for injuries involving the urinary tract. At point 10, a plastic surgeon would be an optimal alternate to the urologist. A general surgeon could handle some procedures as indicated at points 8, 12, 13, and 14.

In general, number codes have been assigned to the anesthesiologist, nurse or corpsman who would handle the designated procedure at the same time that the general surgeon or specialist would be involved in other tasks. Any number followed by an asterisk indicates that, with training, the care provider could do the procedure, but is not the optimal provider.

EXTERNAL GENITALIA

BASIC INSTRUMENT LIST

HEANEY RETRACTORS  
BABY DEAVERS  
RT. ANGLE RETRACTORS  
WEIGHTED SPECULUM  
SHARP RAKES  
MED. WEITLANER  
MED. BABY RICHARDSON  
ARMY/NAVY RETR.  
MEDIUM NEEDLE HOLDER  
LONG NEEDLE HOLDER  
HEANEY NEEDLE HOLDER  
VAGINAL PACKING FORCEP  
SPONGE STICK  
LONG BABCOCKS  
SINGLE TOOTHED TENACULUMS  
LONG OCHSNERS  
KOCKER'S  
HEANEY MUELLERS  
TONSIL CLAMPS  
ALLISES GYNE AILSES - WIDE  
STRAIGHT CRILES  
CURVED CRILES  
LONG METZENBAUM SCISSOR  
MAYO SCISSOR  
SUTURE SCISSAR  
REG. TOWEL CLIPS  
CURVED MOSQUITOES  
STRAIGHT MOSQUITOES  
#3 KNIFE HANDLE  
LONG THUMB FORCEP W/TEETH  
LONG RUSSIAN FORCEP  
SHORT RUSSIAN FORCEPO  
GYNE FORCEPS  
ADSON FORCEP W/TEETH  
METAL CATHETER  
#12 FRAIZER SUCTION TIP

EXTERNAL GENITALIA

SECONDARY LIST

PERI/GYNE DRAPE  
44" X 60" DRAPE  
DRAPE TOWEL  
MAYO STAND COVER  
BACK TABLE COVER  
SURGICAL GOWN  
LARGE STERILE BASIN  
CAUTERY HAND PIECE  
CAUTERY MACHINE  
CAUTERY GROUNDING PAD  
SPONGE, LAP 12" X 12"  
SPONGE, RAYTEX 4" X 4"  
SUCTION TUBING 20'  
SURGICAL GLOVES  
IRRIGATION TUBING Y-TYPE  
CATHETER, 16 FR. 5CC  
CATHETER, 14 FR. 5CC  
CATHETER, 22 FR. 5CC  
CATHETER, 24 FR. 5CC  
CATHETER, 26 FR. 5CC  
STENTS, DOUBLE J  
    6 FR. 24CM  
    6 FR. 26CM  
    7 FR. 24CM  
    7 FR. 26CM  
    8 FR. 26CM  
    8 FR. 28CM  
URINARY DRAINAGE BAG  
SYRINGE, 30CC LUER LOK  
KNIFE BLADE'S #11, #16, #10  
PREP SET  
MICROSCOPE  
DERMATOME  
DERMAMESHER  
SUTURE  
    SILK 2-0 STRAND 18"  
    SILK 3-0 STRAND 18"  
    SILK 3-0 STRAND SH NEEDLE  
    NYLON 3-0 CUTTING  
    NYLON 4-0 CUTTING  
    VICRYL 3-0 SH CR/8  
GAUZE DRESSING, 4" X 8"



EXTERNAL GENITALIA

CYSTO INSTRUMENT LIST

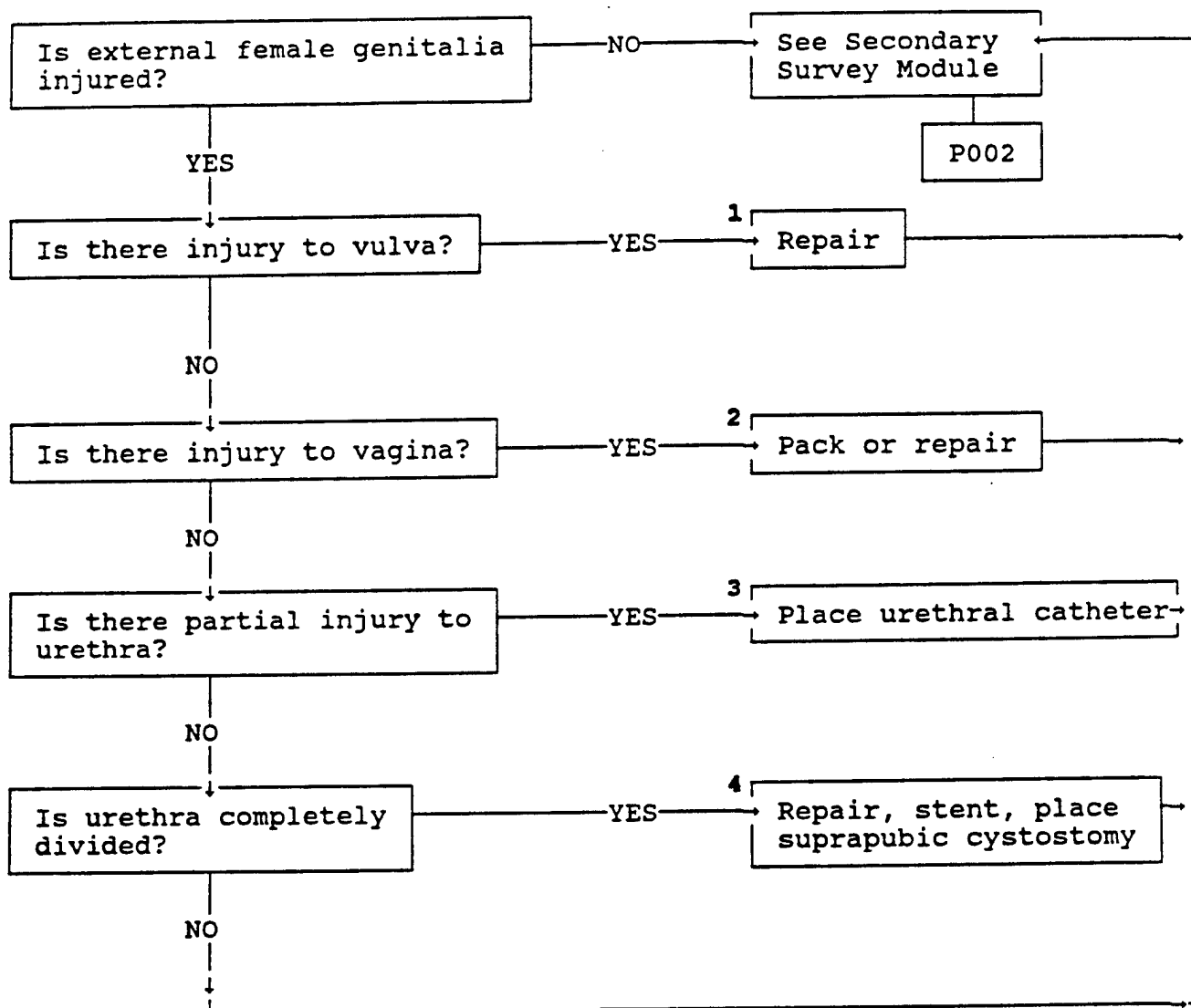
VAN BUREN DILATORS (SIZES #16 THRU 34)  
23.5 SCOPE & OBTURATOR  
19.0 SCOPE & OBTURATOR  
15.5 SCOPE & OBTURATOR  
CATHETER SCOPE & OBTURATOR  
ANGLED BRIDGE  
A.C.M.I. FIBEROPTIC CORD (LIGHT)  
STOP COCK  
70 DEGREE SCOPE LENSE  
30 DEGREE SCOPE LENSE  
GREY NIPPLES  
STRAIGHT BRIDGES  
FIBEROPTIC LIGHT SOURCE

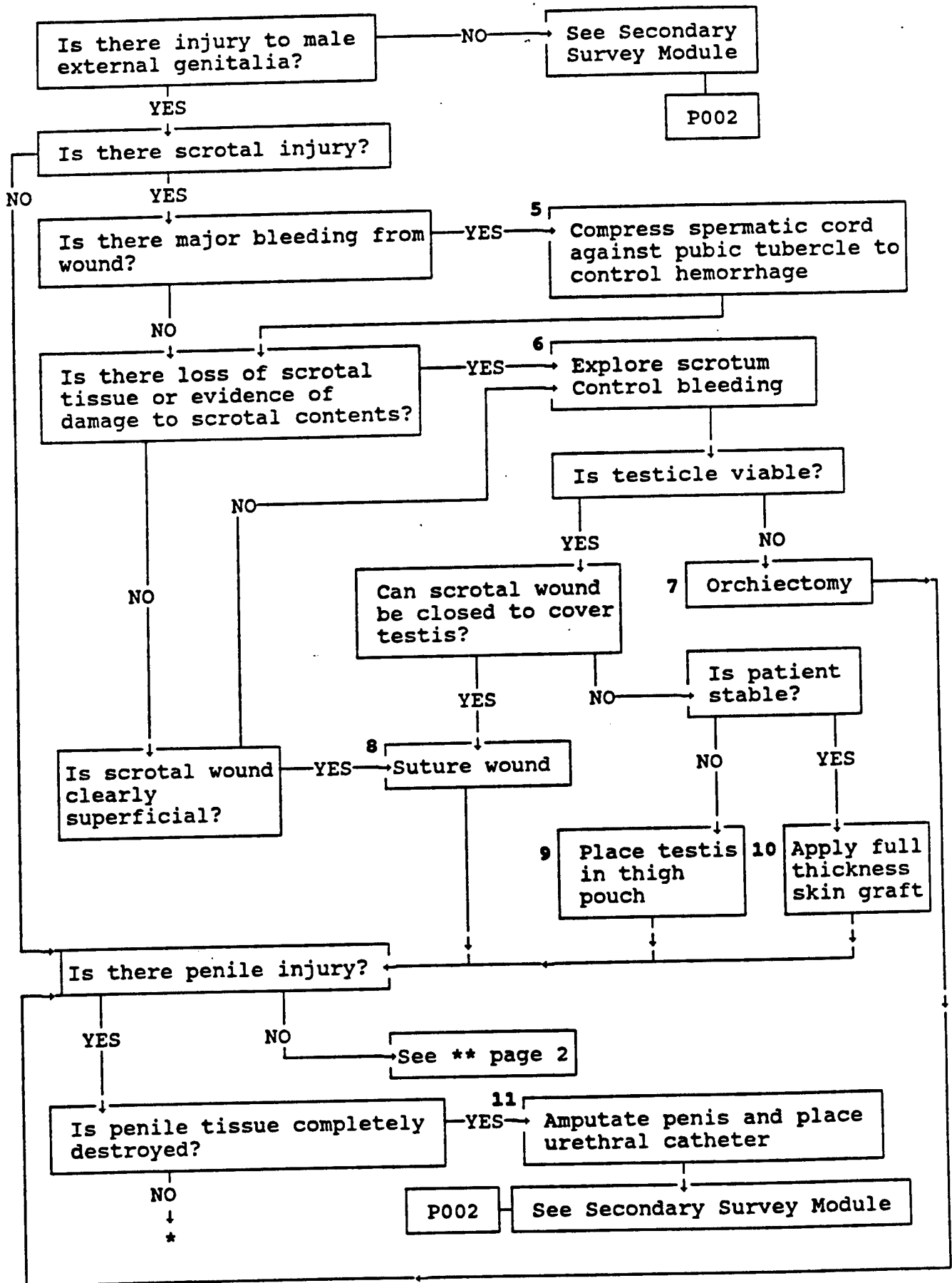
EXTERNAL GENITALIA

PLASTICS INSTRUMENT LIST

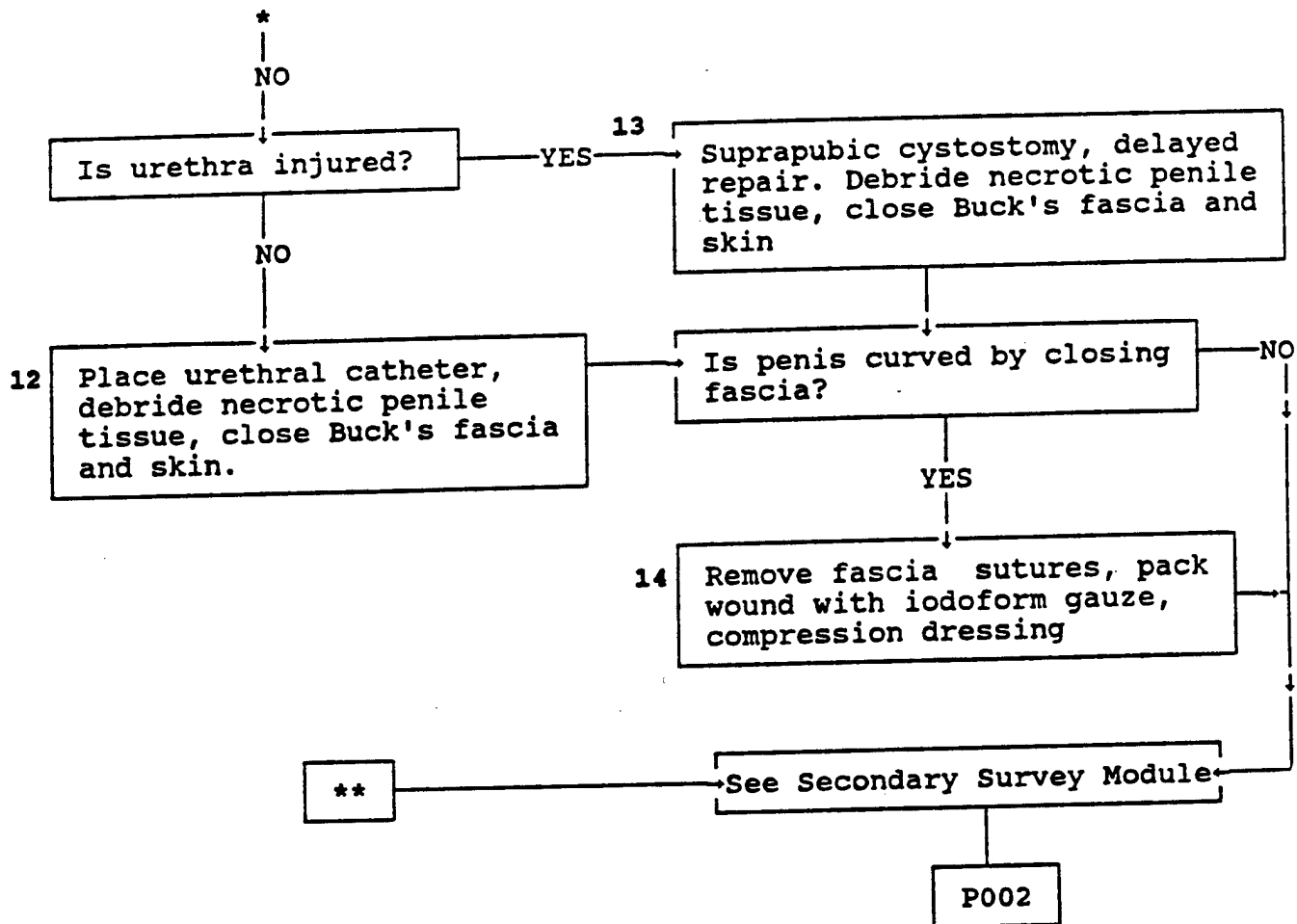
ARMY/NAVY RETRACTORS  
SENN RETRACTOR  
LONG SINGLE SKIN HOOKS  
DOUBLE SKIN HOOKS  
#3 KNIFE HANDLE  
#7 KNIFE HANDLE  
SENKIN THUMBS  
ADSONS W/TEETH  
ADSON BROWNS  
ADSON W/O TEETH  
MEDIUM FRAIZER SUCTION  
FREER ELEVATOR  
PLASTIC NEEDLE HOLDER  
WEBSTER NEEDLE HOLDER  
SHORT NEEDLE HOLDER  
IRIS SCISSORS  
TENOTOMY SCISSOR  
BABY METZ. SCISSOR  
RHINOPLASTY SCISSOR  
JOSEPH SCISSOR  
PLASTIC SUTURE SCISSOR  
REGULAR METZ. SCISSOR  
STRAIGHT MOSQUITOES  
CURVED MOSQUITOES  
CURVED CRILES  
ALLIS CLAMPS  
TONSIL HEMOSTAT  
SMALL TOWEL CLIPS  
27 GA. MICRO IRRIGATION TIP  
30 GA. MICRO IRRIGATION TIP  
.5MM CASTROVIEJO FORCEP  
.12MM CASTROVIEJO FORCEP  
JEWELER'S FORCEP, CURVED  
JEWELER'S FORCEP, STRAIGHT  
MICRO CLIP APPLICATOR  
CASTROVIEJO NEEDLE HOLDER  
WESCOTT SCISSOR  
STEVENS SCISSOR  
STRAIGHT GNATS

FEMALE EXTERNAL GENITALIA INJURY MODULE





MALE EXTERNAL GENITALIA INJURY MODULE



**APPENDIX 1**  
**NUMERICAL AND ALPHABETICAL LISTING OF MODULE NAMES**

The following is a numerical listing of the module numbers and their names. They are ordered as they appear in the volume.

<b>MODULE NUMBERS</b>	<b>MODULE NAMES</b>
H001	HOSPITAL RESUSCITATION & EVALUATION ALGORITHM SERIES
H002	PREHOSPITAL CARE AIRWAY INTUBATION ASSESSMENT MODULE
H003	FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE
H004	FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE A
H005	EXTRAORDINARY AIRWAY MEASURES MODULE
H006	RIGID BRONCHOSCOPY AND REMOVE FOREIGN BODY MODULE
H007	TRACHEOSTOMY TUBE INSERTION MODULE
A001	AIRWAY ASSESSMENT MODULE I
A002	AIRWAY ASSESSMENT MODULE II
A003	PATIENT APNEA MODULE
A004	AIRWAY TREATMENT AND EVALUATION MODULE
A005	AIRWAY EVALUATION MODULE A
A006	ASSISTED AIRWAY MODULE
A007	EMERGENCY INTUBATION MODULE A
A008	EMERGENCY INTUBATION MODULE B
A009	EMERGENCY INTUBATION MODULE C
A010	OROTRACHEAL INTUBATION MODULE
A011	BLIND OROTRACHEAL INTUBATION MODULE
A012	CRICOTHYROIDOTOMY MODULE
A013	NASOTRACHEAL INTUBATION MODULE
A014	TRACHEOSTOMY MODULE A
A015	TRACHEOSTOMY MODULE B
A016	ENDOTRACHEAL TUBE PLACEMENT ASSESSMENT MODULE
B001	BREATHING ASSESSMENT MODULE
B002	BREATHING ASSESSMENT MODULE A
B003	MASSIVELY BLEEDING CHEST WOUND(S) MODULE
B004	CHEST WALL ASSESSMENT MODULE
B005	BREATHING ASSESSMENT MODULE B
B006	BREATHING ASSESSMENT MODULE C
B007	NEEDLE THORACENTESIS MODULE
B008	TUBE THORACOSTOMY MODULE
B009	CHEST TUBE OUTPUT MODULE
B010	BREATHING ASSESSMENT MODULE D
B011	BILATERAL TENSION PNEUMOTHORAX MODULE
B012	CHEST TUBE DECLOTTING MODULE
B013	CHEST TUBE OUTPUT MODULE A
B014	PNEUMOTHORAX MANAGEMENT MODULE

B015        MASSIVE PNEUMOTHORAX MODULE

C001        CIRCULATION MODULE

C002        ESTABLISH I.V. MODULE

MODULE  
NUMBERS

MODULE NAMES

C003        CUTDOWN ON GREATER SAPHENOUS VEIN AT GROIN MODULE  
C004        PERCUTANEOUS SUBCLAVIAN VEIN CATHETERIZATION MODULE  
C005        MULTIPLE I.V. INSERTION MODULE  
C006        ADDITIONAL I.V. INSERTION MODULE  
C007        PERCUTANEOUS INTERNAL JUGULAR VEIN CATHETERIZATION MODULE  
C008        VENOUS BLOOD DRAWING MODULE  
C009        INITIAL I.V. INFUSION RATE MODULE  
C010        FEMORAL ARTERY PALPATION MODULE  
C011        CUTDOWN ON FEMORAL ARTERY MODULE  
C012        BLOOD PRESSURE MODULE  
C013        BLOOD TRANSFUSION MODULE  
C014        BLOOD PRESSURE MODULE A  
C015        MASSIVE TRANSFUSION MODULE  
C016        FOLEY CATHETERIZATION MODULE  
C017        URINE OUTPUT MODULE  
C018        VOLUME CHALLENGE MODULE  
C019        CENTRAL VENOUS PRESSURE MEASUREMENT MODULE  
C020        PORTABLE CHEST X-RAY INTERPRETATION MODULE  
C021        PORTABLE CHEST X-RAY INTERPRETATION MODULE A  
C022        SERIOUS EXTERNAL BLEEDING MODULE  
C023        TRAUMATIC AMPUTATION(S) MODULE  
C024        MANGLED LIMB(S) MODULE  
C025        LARGE BLOOD VESSEL LACERATION MODULE  
C026        VENOUS BLOOD DRAWING ACCESS MODULE  
C027        ARTERIAL CATHETERIZATION MODULE  
C028        CARDIAC ARREST MODULE  
C029        BLEEDING FROM ONE CHEST TUBE MODULE  
C030        MEDIAN STERNOTOMY OPEN HEART MASSAGE MODULE

P001        CONTROL OF BLEEDING MODULE  
P002        SECONDARY SURVEY MODULE  
P003        VENTILATION MODULE  
P004        GASTRIC TUBE MODULE  
P005        INSERTING NASOGASTRIC TUBE MODULE  
P006        CHEST TUBE EVALUATION MODULE  
P007        CHEST TUBE DECLOTTING MODULE A  
P008        AIR LEAK MODULE  
P009        FIBEROPTIC BRONCHOSCOPY MODULE  
P010        TRACHEOBRONCHIAL INJURY MODULE  
P011        CHEST X-RAY MODULE A  
P012        CHEST X-RAY MODULE B  
P013        CHEST X-RAY MODULE C  
P014        SUBPECTORAL CHEST TUBE INSERTION MODULE  
P015        CHEST X-RAY MODULE D  
P016        LUNG HEMATOMA MODULE  
P017        SECONDARY SURVEY MODULE A

P018 SECONDARY SURVEY MODULE B  
P019 SIGNIFICANT EXTREMITY TRAUMA MODULE

MODULE  
NUMBERS

MODULE NAMES

N001	PENETRATING NECK WOUND INJURY MODULE
N002	NECK EXPLORATION MODULE
N003	ARTERIAL INJURY OF NECK MODULE
N004	MAJOR NECK VEIN INJURY MODULE
N005	THYROID INJURY MODULE
N006	PHARYNX OR ESOPHAGUS INJURY MODULE
N007	LARYNX OR CERVICAL THRACHEA INJURY MODULE
N008	EXTERNAL BLEEDING FROM FACIAL WOUND(S) MODULE
N009	EXTERNAL BLEEDING FROM WOUNDS OF HEAD AND NECK MODULE
N010	INITIAL MANAGEMENT OF TONGUE INJURY MODULE
BR001	BRAIN WOUND WITH VENOUS SINUS INJURY (SAGITTAL SINUS) MODULE
BR002	BRAIN WOUND WITH VENOUS SINUS INJURY (TRANSVERSE SINUS) MODULE
BR003	CEREBELLAR WOUND MODULE
BR004	FRONTAL SINUS WOUND MODULE
BR005	OPEN DURA MODULE
BR006	SIMPLE BRAIN WOUND MODULE
BR007	SIMPLE BRAIN WOUND DEBRIDEMENT MODULE
BR008	OCCCLUDED SINUS MODULE
BR009	COAGULATION VARIABLES MODULE
BR010	COAGULOPATHY TREATMENT MODULE
T001	CARDIAC ARREST MODULE II
T002	LEFT THORACOTOMY OPEN CARDIAC MASSAGE EMERGENCY I.V. ACCESS MODULE
T003	OPEN CARDIAC MASSAGE MODULE
T004	PERICARDIAL TAMPONADE MODULE
T005	SUBXIPHOID PERICARDIOTOMY MODULE
T006	SUBXIPHOID PERICARDIOTOMY MODULE A
T007	EMERGENCY CHEST X-RAY MODULE
T008	IMMEDIATE THORACOTOMY MODULE
T009	TRANSSTERNAL THORACOTOMY MODULE
T010	TRANSSTERNAL THORACOTOMY HEART ASSESSMENT MODULE
T011	MEDIAN STERNOTOMY MODULE
T012	ASCENDING AORTA AND ARCH INJURY MODULE
T013	ASCENDING AORTA INJURY MODULE
T014	INNOMINATE ARTERY AORTIC ARCH INJURY MODULE
T015	AORTIC ARCH INJURY MODULE
T016	PULMONARY VEIN MODULE
T017	PULMONARY VENOUS INJURY MODULE
T018	PERICARDIAL VENA CAVAL INJURY MODULE
T019	BLEEDING INTO PERICARDIUM MODULE
T020	HOLE IN HEART EVALUATION MODULE
T021	HEART INJURY CARDIAC ARREST MODULE
T022	CONTINUING ASYSTOLE MODULE
T023	RIGHT ATRIAL CATHETERIZATION MODULE
T024	CONTINUING CARDIAC MASSAGE MODULE



T025	VENTRICULAR DEFIBRILLATION MODULE
MODULE	
NUMBERS	MODULE NAMES

T026	AORTIC ROOT INJECTION MODULE
T027	HEART INJURY ASSESSMENT MODULE
T028	LEFT VENTRICLE ASSESSMENT MODULE
T029	CORONARY ARTERY INJURY MODULE
T030	RIGHT VENTRICLE ASSESSMENT MODULE
T031	TRAUMATIC VENTRICULAR-SEPTAL DEFECT MODULE
T032	RIGHT ATRIAL WOUND ASSESSMENT MODULE
T033	OPEN HEART MASSAGE THROUGH RIGHT THORACOTOMY MODULE
T034	SUPERIOR VENA CAVA WOUND ASSESSMENT MODULE
T035	INFERIOR VENA CAVA WOUND ASSESSMENT MODULE
T036	LEFT ATRIUM PULMONARY VEIN ASSESSMENT MODULE
T037	THORACOTOMY ON SAME SIDE OF WOUND MODULE
T038	IMMEDIATE RIGHT ANTERIOR THORACOTOMY MODULE
T039	RIGHT PERICARDIOTOMY MODULE
T040	RIGHT ANTERIOR THORACOTOMY EXPLORATION MODULE
T041	EMERGENCY RIGHT THORACOTOMY FOR BLEEDING MODULE
T042	RIGHT THORACOTOMY RIGHT HILAR BLEEDING MODULE
T043	PULMONARY ARTERY INJURY MODULE
T044	PNEUMONECTOMY MODULE RIGHT OR LEFT
T045	DISTAL RIGHT PULMONARY ARTERY INJURY MODULE
T046	RIGHT UPPER LOBECTOMY MODULE
T047	RIGHT MIDDLE LOBECTOMY MODULE
T048	RIGHT LOWER LOBECTOMY MODULE
T049	LUNG PARENCHYMAL BLEEDING MODULE
T050	THORACIC VENA CAVA INJURY MODULE
T051	IMMEDIATE LEFT ANTERIOR THORACOTOMY MODULE
T052	LEFT PERICARDIOTOMY MODULE
T053	LEFT ANTERIOR THORACOTOMY EXPLORATION MODULE
T054	EMERGENCY LEFT THORACOTOMY FOR BLEEDING MODULE
T055	THORACIC AORTIC INJURY MODULE
T056	LEFT THORACOTOMY LEFT HILAR BLEEDING MODULE
T057	DISTAL LEFT PULMONARY ARTERY INJURY MODULE
T058	LEFT UPPER LOBECTOMY MODULE
T059	LEFT LOWER LOBECTOMY MODULE
T060	SUBCLAVIAN ARTERY INJURY MODULE
T061	CHEST WALL BLEEDING MODULE
T062	DIAPHRAGMATIC INJURY MODULE
T063	ESOPHAGEAL INJURY MODULE
T064	RIGHT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE
T065	LEFT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE
T066	MYOCARDIAL CONTUSION MODULE
T067	PULMONARY CONTUSION MODULE
AB001	INITIAL EVALUATION OF PENETRATING ABDOMINAL WOUND MODULE
AB002	LAPAROTOMY MODULE
AB003	ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE
AB004	BLADDER INJURY MODULE
AB005	COLON INJURY MODULE
AB006	DUODENUM INJURY MODULE
MODULE	

NUMBERS	MODULE NAMES
AB007	EXTRAHEPATIC BILIARY TRACT INJURY MODULE
AB008	FEMALE REPRODUCTIVE TRACT INJURY MODULE
AB009	LIVER INJURY MODULE
AB010	PANCREAS INJURY MODULE
AB011	PENETRATING TRAUMA IN PREGNANT PATIENT MODULE
AB012	RECTUM INJURY MODULE
AB013	RENAL INJURY MODULE
AB014	RETROPERITONEAL HEMATOMA MODULE
AB015	SMALL BOWEL AND MESENTERY INJURY MODULE
AB016	SPLEEN INJURY MODULE
AB017	STOMACH INJURY MODULE
AB018	URETERAL INJURY MODULE
AB019	VISCERAL VASCULAR INJURIES MODULE
AB020	SUPERFICIAL INJURY MODULE
G001	FEMALE EXTERNAL GENITALIA INJURY MODULE
G002	MALE EXTERNAL GENITALIA INJURY MODULE

#### ALPHABETICAL LISTING OF MODULE NAMES

The following is an alphabetical listing of the module names and their identifying number.

MODULE NUMBERS	MODULE NAMES
AB003	ABDOMINAL AORTA AND VENA CAVA INJURIES MODULE
C006	ADDITIONAL I.V. INSERTION MODULE
P008	AIR LEAK MODULE
A001	AIRWAY ASSESSMENT MODULE I
A002	AIRWAY ASSESSMENT MODULE II
A005	AIRWAY EVALUATION MODULE A
A004	AIRWAY TREATMENT AND EVALUATION MODULE
T015	AORTIC ARCH INJURY MODULE
T026	AORTIC ROOT INJECTION MODULE
C027	ARTERIAL CATHETERIZATION MODULE
N003	ARTERIAL INJURY OF NECK MODULE
T012	ASCENDING AORTA AND ARCH INJURY MODULE
T013	ASCENDING AORTA INJURY MODULE
A006	ASSISTED AIRWAY MODULE
B011	BILATERAL TENSION PNEUMOTHORAX MODULE
AB004	BLADDER INJURY MODULE
C029	BLEEDING FROM ONE CHEST TUBE MODULE
T019	BLEEDING INTO PERICARDIUM MODULE
A011	BLIND OROTRACHEAL INTUBATION MODULE
C012	BLOOD PRESSURE MODULE
C014	BLOOD PRESSURE MODULE A
C013	BLOOD TRANSFUSION MODULE

BR001 BRAIN WOUND WITH VENOUS SINUS INJURY (SAGITTAL SINUS)  
 BR002 BRAIN WOUND WITH VENOUS SINUS INJURY (TRANSVERSE SINUS)  
 B001 BREATHING ASSESSMENT MODULE  
 B002 BREATHING ASSESSMENT MODULE A  
 B005 BREATHING ASSESSMENT MODULE B  
 B006 BREATHING ASSESSMENT MODULE C  
 B010 BREATHING ASSESSMENT MODULE D

C028 CARDIAC ARREST MODULE  
 T001 CARDIAC ARREST MODULE II  
 BR003 CEREBELLAR WOUND MODULE  
 B012 CHEST TUBE DECLOTTING MODULE  
 P007 CHEST TUBE DECLOTTING MODULE A  
 P006 CHEST TUBE EVALUATION MODULE  
 B009 CHEST TUBE OUTPUT MODULE  
 B013 CHEST TUBE OUTPUT MODULE A  
 B004 CHEST WALL ASSESSMENT MODULE  
 T061 CHEST WALL BLEEDING MODULE  
 P011 CHEST X-RAY MODULE A  
 P012 CHEST X-RAY MODULE B  
 P013 CHEST X-RAY MODULE C

**MODULE  
NUMBERS**

**MODULE NAMES**

P015 CHEST X-RAY MODULE D  
 C001 CIRCULATION MODULE  
 BR009 COAGULATION VARIABLES MODULE  
 BR010 COAGULOPATHY TREATMENT MODULE  
 AB005 COLON INJURY MODULE  
 T022 CONTINUING ASYSTOLE MODULE  
 T024 CONTINUING CARDIAC MASSAGE MODULE  
 P001 CONTROL OF BLEEDING MODULE  
 T029 CORONARY ARTERY INJURY MODULE  
 A012 CRICOTHYROIDOTOMY MODULE  
 C011 CUTDOWN ON FEMORAL ARTERY MODULE  
 C003 CUTDOWN ON GREATER SAPHENOUS VEIN AT GROIN MODULE

T062 DIAPHRAGMATIC INJURY MODULE  
 T057 DISTAL LEFT PULMONARY ARTERY INJURY MODULE  
 T045 DISTAL RIGHT PULMONARY ARTERY INJURY MODULE  
 AB006 DUODENUM INJURY MODULE

T007 EMERGENCY CHEST X-RAY MODULE  
 A007 EMERGENCY INTUBATION MODULE A  
 A008 EMERGENCY INTUBATION MODULE B  
 A009 EMERGENCY INTUBATION MODULE C  
 T054 EMERGENCY LEFT THORACOTOMY FOR BLEEDING MODULE  
 T041 EMERGENCY RIGHT THORACOTOMY FOR BLEEDING MODULE  
 A016 ENDOTRACHEAL TUBE PLACEMENT ASSESSMENT MODULE  
 T063 ESOPHAGEAL INJURY MODULE  
 C002 ESTABLISH I.V. MODULE  
 N008 EXTERNAL BLEEDING FROM FACIAL WOUND(S) MODULE  
 N009 EXTERNAL BLEEDING FROM WOUNDS OF HEAD AND NECK MODULE  
 AB007 EXTRAHEPATIC BILIARY TRACT INJURY MODULE

H005	EXTRAORDINARY AIRWAY MEASURES MODULE
G001	FEMALE EXTERNAL GENITALIA INJURY MODULE
AB008	FEMALE REPRODUCTIVE TRACT INJURY MODULE
C010	FEMORAL ARTERY PALPATION MODULE
P009	FIBEROPTIC BRONCHOSCOPY MODULE
H003	FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE
H004	FLEXIBLE FIBEROPTIC BRONCHOSCOPY MODULE A
C016	FOLEY CATHETERIZATION MODULE
BR004	FRONTAL SINUS WOUND MODULE
P004	GASTRIC TUBE MODULE
T027	HEART INJURY ASSESSMENT MODULE
T021	HEART INJURY CARDIAC ARREST MODULE
T020	HOLE IN HEART EVALUATION MODULE
H001	HOSPITAL RESUSCITATION & EVALUATION ALGORITHM SERIES
T051	IMMEDIATE LEFT ANTERIOR THORACOTOMY MODULE
T038	IMMEDIATE RIGHT ANTERIOR THORACOTOMY MODULE
<b>MODULE NUMBERS</b>	<b>MODULE NAMES</b>
T008	IMMEDIATE THORACOTOMY MODULE
T035	INFERIOR VENA CAVA WOUND ASSESSMENT MODULE
AB001	INITIAL EVALUATION OF PENETRATING ABDOMINAL WOUND MODULE
C009	INITIAL I.V. INFUSION RATE MODULE
N010	INITIAL MANAGEMENT OF TONGUE INJURY MODULE
T014	INNOMINATE ARTERY AORTIC ARCH INJURY MODULE
P005	INSERTING NASOGASTRIC TUBE MODULE
AB002	LAPAROTOMY MODULE
C025	LARGE BLOOD VESSEL LACERATION MODULE
N007	LARYNX OR CERVICAL THRACHEA INJURY MODULE
T053	LEFT ANTERIOR THORACOTOMY EXPLORATION MODULE
T036	LEFT ATRIUM PULMONARY VEIN ASSESSMENT MODULE
T065	LEFT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE
T059	LEFT LOWER LOBECTOMY MODULE
T052	LEFT PERICARDIOTOMY MODULE
T056	LEFT THORACOTOMY LEFT HILAR BLEEDING MODULE
T002	LEFT THORACOTOMY OPEN CARDIAC MASSAGE EMERGENCY I.V. ACCESS MODULE
T058	LEFT UPPER LOBECTOMY MODULE
T028	LEFT VENTRICLE ASSESSMENT MODULE
AB009	LIVER INJURY MODULE
P016	LUNG HEMATOMA MODULE
T049	LUNG PARENCHYMAL BLEEDING MODULE
N004	MAJOR NECK VEIN INJURY MODULE
G002	MALE EXTERNAL GENITALIA INJURY MODULE
C024	MANGLED LIMB(S) MODULE
B015	MASSIVE PNEUMOTHORAX MODULE
C015	MASSIVE TRANSFUSION MODULE
B003	MASSIVELY BLEEDING CHEST WOUND(S) MODULE
T011	MEDIAN STERNOTOMY MODULE

C030	MEDIAN STERNOTOMY OPEN HEART MASSAGE MODULE
C005	MULTIPLE I.V. INSERTION MODULE
T066	MYOCARDIAL CONTUSION MODULE
A013	NASOTRACHEAL INTUBATION MODULE
N002	NECK EXPLORATION MODULE
B007	NEEDLE THORACENTESIS MODULE
BR008	OCCLUDED SINUS MODULE
T003	OPEN CARDIAC MASSAGE MODULE
BR005	OPEN DURA MODULE
T033	OPEN HEART MASSAGE THROUGH RIGHT THORACOTOMY MODULE
A010	OROTRACHEAL INTUBATION MODULE
AB010	PANCREAS INJURY MODULE
A003	PATIENT APNEA MODULE
N001	PENETRATING NECK WOUND INJURY MODULE
MODULE	
NUMBERS	MODULE NAMES

AB011	PENETRATING TRAUMA IN PREGNANT PATIENT MODULE
C007	PERCUTANEOUS INTERNAL JUGULAR VEIN CATHETERIZATION MODULE
C004	PERCUTANEOUS SUBCLAVIAN VEIN CATHETERIZATION MODULE
T004	PERICARDIAL TAMPONADE MODULE
T018	PERICARDIAL VENA CAVAL INJURY MODULE
N006	PHARYNX OR ESOPHAGUS INJURY MODULE
T044	PNEUMONECTOMY MODULE RIGHT OR LEFT
B014	PNEUMOTHORAX MANAGEMENT MODULE
C020	PORTABLE CHEST X-RAY INTERPRETATION MODULE
C021	PORTABLE CHEST X-RAY INTERPRETATION MODULE A
H002	PREHOSPITAL CARE AIRWAY INTUBATION ASSESSMENT MODULE
T043	PULMONARY ARTERY INJURY MODULE
T067	PULMONARY CONTUSION MODULE
T016	PULMONARY VEIN MODULE
T017	PULMONARY VENOUS INJURY MODULE

AB012	RECTUM INJURY MODULE
AB013	RENAL INJURY MODULE
AB014	RETROPERITONEAL HEMATOMA MODULE
T040	RIGHT ANTERIOR THORACOTOMY EXPLORATION MODULE
T023	RIGHT ATRIAL CATHETERIZATION MODULE
T032	RIGHT ATRIAL WOUND ASSESSMENT MODULE
T064	RIGHT EMERGENCY THORACOTOMY FOR AIR LEAK MODULE
T048	RIGHT LOWER LOBECTOMY MODULE
T047	RIGHT MIDDLE LOBECTOMY MODULE
T039	RIGHT PERICARDIOTOMY MODULE
T042	RIGHT THORACOTOMY RIGHT HILAR BLEEDING MODULE
T046	RIGHT UPPER LOBECTOMY MODULE
T030	RIGHT VENTRICLE ASSESSMENT MODULE
H006	RIGID BRONCHOSCOPY AND REMOVE FOREIGN BODY MODULE

P002	SECONDARY SURVEY MODULE
P017	SECONDARY SURVEY MODULE A
P018	SECONDARY SURVEY MODULE B

C022	SERIOUS EXTERNAL BLEEDING MODULE
P019	SIGNIFICANT EXTREMITY TRAUMA MODULE
BR007	SIMPLE BRAIN WOUND DEBRIDEMENT MODULE
BR006	SIMPLE BRAIN WOUND MODULE
AB015	SMALL BOWEL AND MESENTERY INJURY MODULE
AB016	SPLEEN INJURY MODULE
AB017	STOMACH INJURY MODULE
T060	SUBCLAVIAN ARTERY INJURY MODULE
P014	SUBPECTORAL CHEST TUBE INSERTION MODULE
T005	SUBXIPHOID PERICARDIOTOMY MODULE
T006	SUBXIPHOID PERICARDIOTOMY MODULE A
AB020	SUPERFICIAL INJURY MODULE
T034	SUPERIOR VENA CAVA WOUND ASSESSMENT MODULE
T055	THORACIC AORTIC INJURY MODULE
T050	THORACIC VENA CAVA INJURY MODULE

**MODULE  
NUMBERS**

**MODULE NAMES**

T037	THORACOTOMY ON SAME SIDE OF WOUND MODULE
N005	THYROID INJURY MODULE
P010	TRACHEOBRONCHIAL INJURY MODULE
A014	TRACHEOSTOMY MODULE A
A015	TRACHEOSTOMY MODULE B
H007	TRACHEOSTOMY TUBE INSERTION MODULE
T010	TRANSSTERNAL THORACOTOMY HEART ASSESSMENT MODULE
T009	TRANSSTERNAL THORACOTOMY MODULE
C023	TRAUMATIC AMPUTATION(S) MODULE
T031	TRAUMATIC VENTRICULAR-SEPTAL DEFECT MODULE
B008	TUBE THORACOSTOMY MODULE
AB018	URETERAL INJURY MODULE
C017	URINE OUTPUT MODULE
C026	VENOUS BLOOD DRAWING ACCESS MODULE
C008	VENOUS BLOOD DRAWING MODULE
P003	VENTILATION MODULE
T025	VENTRICULAR DEFIBRILLATION MODULE
AB019	VISCERAL VASCULAR INJURIES MODULE
C018	VOLUME CHALLENGE MODULE

## APPENDIX 2

### PROCESS FOR THE DEVELOPMENT OF THE ALGORITHMS AND REMAINING CONTROVERSIES

The algorithms were developed to address the acute care needs of combat casualties who have sustained a penetrating injury, presuming optimal care and resources are available. Initially, several surgeons (called originators here) designed and prepared two blocks of algorithms, 149 algorithms (modules) in all. The first block deals with the ABC's of trauma (Airway, Breathing, Circulation) reflecting medical stabilization of an injured patient. The second block addresses the surgical management of wounds in the head, neck, brain, face, thorax, abdomen, genitalia and extremities.

Each algorithm was reviewed by at least two appropriate surgeons, among a panel of general surgeons, thoracic surgeons, and neurosurgeons, all but one of whom had combat clinical experience. The reviewers were encouraged to provide critical comments on the algorithms and to assign each algorithm a level of acceptability: 1. acceptable as is, 2. acceptable with minor revisions, 3. requires major revisions, and 4. completely unacceptable. To promote objectivity, the designers and reviewers were kept anonymous.

For perspective on the first round of reviews, the (aggregate) percentages for each acceptability level are shown (Table 1).

TABLE 1

#### Aggregated Percentages For Each Acceptability Level

Acceptability Level	Percentage
1. Acceptable as is	68
2. Acceptable with minor revisions	16
3. Requires major revisions	13
4. Completely unacceptable	3

Most reviewers also proposed detailed modifications, and, in some cases, references justifying their proposals. These proposals ranged from seemingly minor issues, such as choice of suture material and antibiotic, to blatantly important issues, such as choice of surgical procedure associated with a "major laceration in the body or tail of the pancreas", and preference for craniotomy over craniectomy.

The reviews were returned to the originators, who revised the algorithms to account for most (about 75%) of the proposed changes. The originators provided counter-arguments to reviewer comments with which they did not concur. Also the originators were asked to develop 51 additional (mostly thoracic) modules, referred to,

but not developed, in the revised set of 149 modules.

The revised 149 modules were subjected to a second round of reviews, and the 51 new modules were subjected to independent reviews by two thoracic surgeons. The reviewers were requested to provide the information requested in the initial review plus 1) comments on the "controversial issues" remaining from the first round of "review and originator responses" and 2) assignments of each module to level of care categories (optimal, nearly optimal, average, below average, poor).

With regard to the 51 new modules, Tables 2 and 3 give the (aggregate) percentages for acceptability levels and level of care categories assigned by the two reviewers.

TABLE 2

Aggregated Percentages for each Acceptability Level for the  
51 New Modules: Assigned by two Reviewers

Acceptability Level	Percentage
1. Acceptable as is	46
2. Acceptable with minor revisions	29
3. Requires major revisions	21
4. Completely unacceptable	4

TABLE 3

Aggregated Percentages for each Level of Care Category for  
the 51 New Modules: Assigned by two Reviewers

Level of Care Category	Percentage
1. Optimal	54
2. Nearly optimal	19
3. Average	19
4. Below Average	7
5. Poor	1

Tables 4 and 5 give the (aggregate) percentages for acceptability levels and level of care categories from reviewer responses (second review) for the 149 modules. Most of the modules with acceptability levels 3 and 4 were rated by 1) one reviewer who reacted strongly to usage of the phrase "Cease further efforts" by the originators for patient status situations which they deemed hopeless, and 2) one (of three) neurosurgical reviewer who strongly opposed the use of craniectomy rather than craniotomy.



TABLE 4

Aggregated Percentages for each Acceptability Level for the  
149 Modules: Second Review

Acceptability Level	Percentage
1. Acceptable as is	70
2. Acceptable with minor revisions	24
3. Requires major revisions	4
4. Completely unacceptable	2

TABLE 5

Aggregated Percentages for each Level of Care Category for the  
149 Modules: Second Review

Level of Care Category	Percentage
1. Optimal	68
2. Nearly Optimal	18
3. Average	7
4. Below Average	5
5. Poor	2

In July, 1989, an in-depth conference was held with the principal originators to address all remaining comments and criticisms of the reviewers. Some modules were modified, some rewritten, some eliminated, some new ones written, and some were re-ordered. This effort resulted in 196 revised modules. We believe that these modules represent consensus optimal modules for acute management of combat casualties with the exceptions noted in the section on "remaining controversies".

To give a sense of the activity of the July 1989 conference the next several paragraphs detail the originators' deliberations and responses to the concerns of the reviewers.

#### AIRWAY

Several general criticisms of the AIRWAY and BREATHING sections were made by the reviewers. They included concerns about precautions for handling C-spine injuries, the use of terms such as "Sellick maneuver", which may not be familiar to surgeons by that name, a need to standardize dosages and measurements of blood loss and oxygen administration, and that the AIRWAY and BREATHING modules should be re-classified, combined, or modified to present a more consistent flow.

In the first instance, the originators responded by pointing out that penetrating injuries only were considered in the design of the algorithms and most C-spine precautions would normally be unnecessary under such circumstances. However, the originators have taken note of potential problems in the opening box of the amended A006 - ASSISTED AIRWAY.

Expressions such as "Sellick maneuver" have been replaced with text which details the required procedure, as in #2 of box 1 of A010 - OROTRACHEAL INTUBATION.

A standardized measure of 20 breaths/min was adopted for ventilation rates. Also, standardized doses of paralytic agents such as norcuron were adopted throughout the modules.

### BREATHING

The BREATHING modules move through a progression of visual observation for indications of respiratory distress, open pneumothorax and/or copious bleeding to diagnosis and treatment of obvious injuries. In doing this, modules were expanded, combined, simplified, and in some cases changed materially from the previous version. The question of standardized chest tube output was raised by the reviewers and addressed, as in B009 - CHEST TUBE OUTPUT.

Other points raised include the timing of obtaining a chest x-ray in the diagnostic flow of the modules. The criticism has been addressed in the new B013 - CHEST TUBE OUTPUT MODULE A and is done after a chest tube has been inserted. The originators have followed ATLS procedures here.

Also the designers feel that the use of optimal equipment answers the reviewers' concerns about accurately measuring air leaks. The latest equipment has this capability.

### CIRCULATION

The modules of the CIRCULATION section were re-written to address concerns expressed by reviewers, and some modules which were redundant have been eliminated. Most suggestions advanced by reviewers were adopted. Several proposed changes (related to C015 - MASSIVE TRANSFUSION and C016 - FOLEY CATHETERIZATION), however, reflect the optimal versus field hospital care situations. Since only optimal conditions of personnel and equipment were considered in the design of the algorithms these proposals were not adopted.

C015 - MASSIVE TRANSFUSION has generated a difference of opinion as to the necessity of drawing blood from the arterial line every 30 minutes to measure blood products. The originators stand by their contention that prolonged coagulopathy leads to liver injury, hypothermia, and brain & muscle injury. Monitoring and adjusting for falling fibrinogen and platelets can assist in modifying blood product replacement. Frequent monitoring of serum potassium helps to avoid hypo- and hyperkalemia in cardiac arrest during resuscitation with large volume infusions.

For C010 - FEMORAL ARTERY PALPATION, a reviewer questioned why the catheters used in the femoral artery are not more precisely defined as to length and gauge. The originator responded by stating that a variety of catheters would be available under optimal conditions and need not be specified in each module.

A suggestion was made regarding C016 - FOLEY CATHETERIZATION at the node which reads

Perform percutaneous suprapubic cystostomy

A reviewer suggested that fluid resuscitation be performed first to allow the bladder time to distend prior to placement of a cystostomy. The originators responded by indicating that if the penis or pubic area is injured to the point where a catheter cannot be inserted, a cystostomy is indicated.

Also at the node which reads

Is there torrential hemorrhage (mixture of blood and urine flowing in excess of 250 ml/min or urine hematocrit > 25%)?

a reviewer indicated that he had never encountered such a degree of hematuria even in the most severe injuries to the bladder, ureter or kidney and suggested the node be removed.

The originators responded that they had seen such cases and that the node should be retained.

## THORAX

T042 - RIGHT THORACOTOMY RIGHT HILAR BLEEDING MODULE provoked the strongest controversy regarding whether a pneumonectomy or lobectomy was the proper surgical procedure in severe lung injuries. The originators were adamant in that they feel strongly that a pneumonectomy is not "optimal" if the lesser procedure of a lobectomy will address the problem and would certainly be in the patient's best interest. T049 - LUNG PARENCHYMAL BLEEDING MODULE stimulated a reviewer suggestion regarding the manner in which an air leak problem is addressed. The originators modified the module by inserting new boxes to handle "major air leaks" which proceed to indications for a lobectomy in the event ventilation is severely compromised.

All other differences of opinion were considered minor and were addressed by the originators by refinements throughout the new thoracic section, with the exception of the new T060 - SUBCLAVIAN ARTERY INJURY. In this case, a reviewer questioned the use of an interposition graft to repair the arterial wall, citing the difficulty of grafting and suggested ligation instead. The

originators maintain that arterial repair is ideal to maintain function, particularly since all casualties may not be young men and injury could be sustained by an officer or others with pre-existing vascular problems.

#### BRAIN

Minor amendments have been made throughout the BRAIN modules to address such issues as the use of angiograms, CT scans and x-rays in diagnosing the extent of brain injuries as in BR002 - BRAIN WOUND WITH VENOUS SINUS INJURY (TRANSVERSE SINUS) & BR004 -FRONTAL SINUS WOUND; definition of the method by which the dura is opened (BR005 - OPEN DURA); positioning of the patient to give optimal access to the wound and major intracranial structures (BR006 - SIMPLE BRAIN WOUND); and the use of the latest equipment, such as an air turbine drill in the preparation of a removable skull plate, BR002 - BRAIN WOUND WITH VENOUS SINUS INJURY (TRANSVERSE SINUS)). These and other minor amendments reflect the reaction of the originator to the comments of the reviewers.

Also, EXTERNAL BLEEDING FROM FACIAL WOUNDS and EXTERNAL BLEEDING FROM WOUNDS OF HEAD AND NECK have been moved from the BRAIN section to the NECK AND FACE section.

Another suggestion concerned the necessity for a module(s) covering coagulopathy. Although the originator indicated that he did not feel that checking for coagulopathy was necessary for the majority of brain wounds, modules BR009 and BR010 were designed and added to the BRAIN sequence and referenced in BR004.

The fourth point arose from the optimal versus combat situation where calling on specialists, such as plastic surgeons or ophthalmologists was in question. The originator agreed to the insertion of nodes calling upon specialists in the appropriate areas.

#### ABDOMEN

This section has been revised to eliminate the SOFT TISSUE module and to incorporate a new module AB001 - INITIAL EVALUATION OF PENETRATING ABDOMINAL WOUND which serves as an overview of abdominal injuries.

There were five major suggestions by the reviewers.

1. In AB003 - ABDOMINAL AORTA AND VENA CAVA INJURIES, the block which reads

Create conduit from autologous vein or artery  
or ligate aorta and perform extra-anatomic  
bypass

was questioned by a reviewer who felt that an extra-anatomical bypass was time-consuming and beyond the scope of many surgeons. He felt that it would be best to recommend aortic replacement using Gore-Tex, and worry about the suture line disruptions and mycotic

aneurysms at a later time. A second reviewer stated that the decision as to which course to pursue should depend upon the degree of contamination and status of the patient. Yet another reviewer indicated that an extra-anatomic bypass is easier than creating a conduit from the autologous vein and a tough aortic replacement. The originators responded that the treatment is optimal, and that placement of prosthetic material, even in a contaminated field, is an alternative, but not ideal.

2. In AB005 - COLON INJURY, a reviewer commented on the entire sequence down the left side of the algorithm. He felt that as written, shock and loss of blood play no role in determining the choice between repair and resection. The originator responded that the sequence is valid. Several other reviewers agreed with the originator's stand and no changes were made.

3. AB006 - DUODENUM INJURY was amended to read:

Repair primarily. Use closed drain being sure to place it away from repair. Decompress with NG tube, duodenostomy, or retrograde jejunostomy, fed back into duodenum.

in response to reviewers' comment about the necessity of placing the drain away from the area of repair.

One reviewer also suggested that, when faced with major pancreatic or duodenal injuries, surgeons should insert a needle feeding jejunostomy since prolonged duodenal ileus and/or intra-abdominal sepsis with accompanying ileus occur in approximately half of such patients. However, the originator and most reviewers agreed that hyperalimentation should be left to the surgeon's discretion.

4. An early version of AB009 - LIVER INJURY, was amended to read

Control bleeding with sutures or hemostatic agents. Drain with closed drainage system.

in response to a reviewer's comment that liver injuries should be drained routinely. Most reviewers agreed with his stand.

5. The review of AB013 - RENAL INJURY provoked a question as to whether to attempt revascularization of an injured kidney or perform a nephrectomy using length of time of renal ischemia as the determinant. A reviewer stated that the average ischemic time of successful revascularization exceeds four hours, and that the decision to revascularize depends on such factors as patient stability and whether the patient has a functioning second kidney.

Both the originators and most reviewers agree that the module should stand as written, although the presence of multiple injuries may dictate a nephrectomy.

## EXTERNAL GENITALIA

One reviewer felt that there was no advantage, and indeed disadvantages in placing the testis in a subcutaneous thigh pouch as indicated in G002 - MALE EXTERNAL GENITALIA INJURY.

However, both the originator and most reviewers agree that the procedure was sound, especially in an unstable patient, where deferred treatment is planned.

## REMAINING CONTROVERSIES

A large majority of the so-called "remaining" controversial issues between the originators and reviewers are attributable to perceived differences between optimal care (the presumption of unlimited resources) and field hospital care (which often involves multiple casualties and clinical compromises for the presumed good of all patients). Such (field versus optimal) issues arose throughout the entire review and revision process, although the goal of "optimal" decision trees was stated and emphasized in all communications with originators and reviewers. Despite these goal-focus efforts, reviewers would often and originators would occasionally argue for the "field hospital case". Nonetheless the Cyometrics staff has striven to redirect the focus to "optimal" care and we believe that the algorithms presented reflect current optimal care. In this section we first delineate the controversial points that are not "field versus optimal" issues. We follow this by a discussion of the "potential" for differences between field hospital and optimal care.

### CONTROVERSIAL POINTS IN VOLUME I THAT ARE NOT "FIELD HOSPITAL VERSUS OPTIMAL CARE" ISSUES

There are four major controversial points, which are discussed here.

#### 1. Placement of the needle in needle thoracentesis.

A reviewer suggested the axillary insertion route as opposed to a more anterior placement of the needle. The cardiothoracic surgeons who designed the module feel that the anterior approach is standard and preferred, in that it avoids potential kinking of the line by movement of the patient's arm when the axillary approach is used.

#### 2. The question of craniectomy versus craniotomy as indicated in BR004 - FRONTAL SINUS WOUND and BRO07 - SIMPLE BRAIN WOUND DEBRIDEMENT.

The reviewer states

"We are probably not going to be able to

resolve the difference of opinion between the originator and the reviewer relative to craniectomy versus craniotomy. I have previously enclosed the monograph relative to the usefulness and safety of a craniotomy in combat conditions. The originator does not totally appreciate the fact that a complete debridement of potentially infected skull is accomplished as part of the craniotomy technique. He also disregards the secondary risk factors of a cranioplasty."

In a paraphrased rebuttal, the originator indicated

No amount of talking would convince him that a craniotomy is acceptable in dealing with contaminated and potentially infected skull bone. He maintained that a craniectomy is more physiologically sound.

### 3. Necessity of dural closure.

Several reviewers expressed concern regarding the necessity of dural closure as in BR005 - OPEN DURA. One reviewer commented

"Again, we have a point of difference between the reviewer and the originator relative to the necessity of a dural closure. The point to be made here is that the "cerebral envelope" should be restored anatomically and water-tight in a mode that insures a full decompression of the underlying cerebral tissue. This can be accomplished by excellent closure of other anatomical layers external to the dura or by the use of expanding grafts in the dural layer. The latter technique, of course, carries an added morbidity risk of infection in a graft. The plea here is for common sense that cerebral tissue needs to remain decompressed and that an anatomical barrier be re-created to preclude bacterial contamination associated with a spinal fluid fistula."

The originator responded that, in his opinion, the dura should virtually, always be closed. If decompression were needed, he would favor a loose dural graft.

A second reviewer commented

"I do not agree that tight dual closure is necessary anywhere except over air-filled sinuses or in fistula-prone areas, or, except

where scalp closure is not secure. Most closures can be reinforced with only patches, even gelfoam, without CSF fistulae developing or brain coming through, if brain is loose at closure."

To this comment, the originator replied

"I strongly disagree here. In my opinion the dura should have a water-tight dural graft to prevent CSF leakage which is a preventable complication which can lead to meningitis and death. I am not willing to compromise here."

#### 4. Uterus Evacuation.

AB011 - PENETRATING TRAUMA IN PREGNANT PATIENT occasioned a comment about the evacuation of the uterus in the penetration of the full thickness of the uterine wall. The reviewer stated

"Penetration of the uterus in a pregnant woman is not an indication for evacuation of the uterus unless the size of the gravid uterus prevents visualization and repair of other maternal injuries. In the absence of this circumstance, the uterus should be closed primarily with double layers of interrupted chromic sutures. More than 95% of intrauterine fetal injuries are fatal, but more than 90% of these women will spontaneously abort their dead fetus without difficulty within three weeks."

An originator disagreed and commented

"If you don't get the fetus out, you have no way to assess injuries to the fetus. Even if you have only a 5% chance of saving the fetus, I think you should take it. A C-section is a well-tolerated procedure and a small price to pay for a live baby."

Another reviewer agreed with the first review and indicated that penetrating injuries to the uterus are almost always fatal to the fetus, and that no attempt to salvage a child through a C-section should be undertaken.

Yet another reviewer felt that, if at term (>28 weeks), a C-section and repair of the infant/fetus should be attempted. In other circumstances, he felt that it represents better management to evacuate the uterus and make repairs. He does raise the problem of the frequent incidence of disseminated intravascular coagulation (DIC) from retained fetal products in injured mothers.

The originator rejects the first two reviewers' comments and



feels that the third reviewer's concern about DIC lends credence to his stand that the module should remain unchanged.

POTENTIAL FOR DIFFERENCES BETWEEN FIELD HOSPITAL CARE AND OPTIMAL CARE

The decision trees were designed presuming that unlimited and state-of-art resources are available for each casualty. In most combat scenarios involving many casualties, this presumption is extremely optimistic. Cases that require much time and resources are often, necessarily, managed at a suboptimal level taking into account the needs of all wounded patients.

The decision tree originators and reviewers agree that, generally, these cases are apparent, that clinicians are capable of improvisation reflecting available resources and needs of other patients, and that it would not be possible to explicitly define all circumstances for which one should use an optimal procedure.

Potential for significant differences between optimal care and field care (when there are limited resources for the multiple casualties) mentioned by reviewers were the following:

<u>OPTIMAL PROTOCOL</u>	<u>POSSIBLE FIELD ALTERNATIVES IN COMPROMISED CIRCUMSTANCES</u>
Management incorporating blood chemistries	Management without benefit of blood chemistries
Management incorporating CT scans	Management without benefit of CT scans
Management incorporating X-rays	Management without benefit of X-rays
Management incorporating fiberoptic bronchoscope	Management without benefit of fiberoptic bronchoscope
Pulmonary artery repair	Ligation or pneumonectomy
Isolated apical anterior artery repair	Lobectomy or pneumonectomy
Major bronchus repair	Right middle-lower lobectomy or pneumonectomy
Upper lobe bronchi repair	Lobectomy
Cardiopulmonary bypass surgery	Transfer
Treat pulmonary contusion	Transfer (only if absolutely necessary)

Treat myocardial contusion

Transfer (only if absolutely necessary)

Manage massive liver injury

Pack and transfer (only if absolutely necessary)

Manage major pancreatic-duodenum injury

Pack and transfer

Flail chest fixation

Intubate, ventilate and transfer